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Public Health Reports

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DOMESTIC WATER AND DENTAL CARIES

I. A Dental Caries Study, Including *L. Acidophilus* Estimations, of a Population Severely Affected by Mottled Enamel and Which for the Past 12 Years Has Used a Fluoride-Free Water [1]

By H. TRENDLEY DEAN, *Dental Surgeon*, PHILIP JAY, *Consultant*,[2] FRANCIS A. ARNOLD, JR., *Passed Assistant Dental Surgeon*, and ELIAS ELVOVE, *Senior Chemist, United States Public Health Service*

Epidemiological evidence points to an inverse relationship between endemic dental fluorosis (mottled enamel) and dental caries (*1, 2, 3, 4*). Recent reviews (*5, 6*) have discussed many of the epidemiological, biochemical, bacteriological, and experimental aspects of this phenomenon, but its mechanism is not, as yet, clear. Whether or not this inhibitory agent operates locally, systemically, or even involves structural or compositional factors is still undetermined. Recent studies (*7, 8, 9, 10, 11, 12, 13*) shed some light on certain aspects of the essential points involved.

For the purpose of possibly clarifying several of these questions, insofar as they relate to human populations, quantitative epidemiological studies were planned, involving (*a*) populations exposed to waters of a relatively high fluoride concentration during the period of tooth calcification followed by exposure, during the post-eruptive period, to waters free of fluorides; and (*b*) populations whose teeth calcified while using waters free of fluorides followed, during the post-eruptive tooth period, by exposure to waters whose fluoride (F) content exceeded the minimal threshold of endemic dental fluorosis, one part per million.

This report describes a study embodying many of the requisites of this first desideratum. A subsequent paper in this series will record the results of a study in which an almost opposite set of conditions prevailed.

This study was made at Bauxite, Ark., a community which has occupied a prominent place in mottled-enamel history. In 1928 Kempf

[1] From the Division of Infectious Diseases with the cooperation of the Division of Chemistry, National Institute of Health.

[2] Assistant Professor, University of Michigan School of Dentistry.

and McKay (*14*) conducted a mottled-enamel study of this community and recorded an incidence of affection of 100 percent. The public water supply at that time was obtained from deep wells and was subsequently found to contain one of the highest fluoride concentrations of any known common water supply in the United States, close to 14 parts per million. As might be expected, an unusually severe type of mottled enamel had developed in the community. A few months after the 1928 survey, Bauxite changed its public water supply from that of the deep wells to a water obtained from the nearby Saline River, a water free of fluorides and which had been used by the nearby city of Benton for a number of years.

1938 BAUXITE SURVEY

Approximately 10 years after the change in the water supply, the children of Bauxite were resurveyed by Dean, McKay, and Elvove (*15*). Briefly, their study showed that the older children, whose permanent teeth had calcified while they were using the "old," or deep-well supply, showed moderate to severe types of mottled enamel, while those children born subsequent to the change in the water supply were practically free of mottled enamel. For details of this study the original report (*15*) should be consulted.

The dental conditions of the 106 Bauxite school children (ages 6–15 years) were examined independently [3] by each of the field examiners (H. T. D. and F. S. McK.). All examinations were made with the aid of mouth mirrors and explorers. In addition to the enamel hypoplasia characteristic of endemic dental fluorosis (mottled enamel), other dental pathology such as dental caries (treated and untreated), missing teeth, and types of enamel hypoplasia other than mottled enamel, were recorded. Following the clinical examination, the home of each child was visited and the parent interviewed regarding the type of domestic water used by the child throughout life. This house-to-house recheck resulted in the elimination of the schedules of 24 children whose histories indicated the use of a domestic water, other than the Bauxite communal water supply, for a period exceeding 30 days in any calendar year. After the house-to-house check there remained 82 children whose history, confirmed by the parents, indicated continuous exposure to the Bauxite communal water supply.

Because of the complementary nature of the unpublished dental caries data from the 1938 mottled enamel study of Dean and McKay, a brief analysis of their findings, together with a short reference to certain epidemiological constants, is introduced as a means of aiding

[3] In independent dental examinations it is obvious that no two dental examiners will be in complete agreement with respect to all teeth diagnosed as carious. This is especially true in communities characterized by low dental caries experience rates where oftentimes pits and fissures introduce an important problem of subjective assessment. Table 1 therefore reports only those teeth on which both examiners were in agreement.

in a clearer conception of the findings of a study made at Bauxite in April 1940. In the epidemiology of dental caries it is generally accepted that under normal conditions the dental caries experience rates[4] bear a direct relationship to the number of years of exposure to the risk of dental caries. Since dental caries is a lesion incapable of self-repair, the dental caries experience rates for any single age group represent the dental caries experience of that group cumulative through the post-eruptive period, or period of exposure (*cf.* the number of DMF teeth per 100 cases, table 1 of reference *16*).

The amount of dental caries experienced by deciduous teeth cannot be determined by a single clinical examination with the same quantitative precision as that for permanent teeth, since it is not possible to determine whether missing deciduous teeth were lost because of dental caries, or as a result of normal physiological exuviation. It does not seem illogical, however, to assume that years of post-eruptive exposure bear a somewhat similar relationship to the amount of dental caries in the deciduous teeth present as has been observed in the permanent teeth.

An analysis,[5] therefore, was made of the amount of dental caries in the deciduous molars and the first permanent molars of the 82 children with verified continuity of exposure to the Bauxite common water supply. All missing deciduous molars were excluded from the tabulations for the reason previously stated, and the percentage incidence of dental caries affection was based upon the number of teeth actually present in the mouth.[6] Missing permanent first molars, of which there were two, were assumed to have been lost as a result of dental

[4] The term "dental caries experience" was introduced by Klein and Palmer (Pub. Health Rep., 55: 187-205 (Feb. 2, 1940), and earlier articles referred to in this reference) who state that "a reconstitution of the caries experience in the permanent teeth of children may be accomplished with a fair degree of precision by totaling the *mutually exclusive* numbers of carious teeth (irrespective of the number of defects per tooth), the number of filled teeth, and the number of extracted teeth plus those indicated for extraction. The summation of these values gives a count of the number of permanent teeth showing evidence of having been attacked by caries; * * *." When it is desired to express dental caries experience as a rate per 100 children, the sum of the four aggregates referred to (number of teeth with untreated dental caries, filled teeth, extracted teeth, and those indicated for extraction) is divided by the number of children examined and the quotient multiplied by 100.

In the reference cited above, attention is also called to the fact that teeth with evidence of caries experience have been designated by various other terms. Salzman, for instance, uses the expression "ex-teeth," while Hollander and Dunning refer to them as "affected teeth."

[5] The limited number of children available for study (82), distributed over a wide age group (6-15 years), a period when the permanent dentition is subject to varying changes because of the eruption of the permanent teeth, precludes a computation of dental caries experience rates. In the instance of the 1938 data, therefore, study of the dental caries experience is limited to such constants as the deciduous molars present and the first permanent molars, the results being reported on the basis of the percentage incidence of dental caries experience.

[6] In a community where the clinical examinations indicate an average amount of reparative dental care (fillings, etc.), it may be assumed that a portion, at least, of the population has recourse to dental practitioners for alleviation of their dental needs. Under such conditions it is possible that certain deciduous molars with advanced dental caries may have been extracted by a dentist prior to the time that the tooth would have been normally exuviated. In these 82 children, however, not a single instance of a filled tooth, deciduous or permanent, was noted and one would seem warranted in assuming that in this particular group practically all missing deciduous molars were lost as a result of normal physiological exuviation.

caries; three other first permanent molars showing extensive carious involvement were diagnosed as "extraction indicated."

The dental caries findings of the 1938 study are summarized in table 1. While the number of observations is small there seems to be an inverse relationship between the amount of dental caries and exposure to the "old" common water supply with the high fluoride content. The Bauxite population prior to May 1928 had been exposed to a fluoride intake of unusually high concentration and it would seem that the physiological effects, insofar as they relate to the inhibitory influence on dental caries, had carried over for several years after the change to the fluoride-free river water.

TABLE 1.—*Summary of dental caries findings in 82 Bauxite (Ark.) children with verified continuity of exposure to the common water supply according to the 1938 survey of Dean and McKay*

	Born subsequent to water change				Born prior to water change						Total
Age	6	7	8	9	10	11	12	13	14	15	
Number of children	5	14	8	13	5	7	6	10	7	7	82
	Deciduous molars [1]										
Number of children with deciduous molars present	5	14	8	13	5	5	3	2	1	1	[3] 57
Number of deciduous molars present in which both examiners' diagnoses agreed	39	104	59	82	27	[2] 16	9	10	2	2	[3] 350
Number of deciduous molars with dental caries experience [1]	14	38	11	20	4	2	0	0	0	0	89
Percent with dental caries experience	36		22								
	29							9			
Approximate number of years of exposure to risk of caries	4.7		6.6					9.2			
	First permanent molars										
Number of first permanent molars in which examiners' diagnoses of caries agreed	18	50	28	40	18	25	16	36	24	26	[4] 281
Number of first permanent molars with dental caries experience	2	27	14	17	3	5	6	21	19	9	[4] 123
Percent with dental caries experience	42		46			24			57		
	44					43					
Approximate number of years of exposure to risk of caries	1	2	3		4	5	6	7	8	9	
	1.7						6.7				
Mottled enamel diagnosis of those first permanent molars referred to above:											
Number	18	50	28	40	18	25	16	36	24	26	
Negative	18	46	28	35	18	20	7	7	0	0	
Questionable	0	2	0	3	0	4	2	3	0	0	
Mottled enamel	0	2	0	2	0	1	7	23	23	26	
Missing, no diagnosis, etc	0	0	0	0	0	0	0	3	1	0	

[1] Missing deciduous molars excluded from these tabulations.

[2] Two of these molars were diagnosed as "questionable" mottled enamel; no positive diagnoses of mottled enamel were made in any of the deciduous molars in this entire group.

[3] In these 57 children, 368 deciduous molars were present. Both examiners were in agreement as to the presence or absence of dental caries in 350, or approximately 95 percent, of the cases.

[4] In the 82 children in this group there were 328 first permanent molars. For purposes of determining dental caries experience, two molars extracted because of caries were included in the total. The examiners' diagnoses were in agreement in 281, or approximately 86 percent, of the cases.

N. B. Ages 2½ years for deciduous molars and 6½ years for first permanent molars were selected as the time of eruption upon which years of exposure to risk were computed. The limited number of observations did not warrant a separate break-down for the first and second deciduous molars.

In table 1 the incidence of dental caries in deciduous molars does not show the cumulative increase concomitant with increasing years

of exposure. It actually reverses this trend; the highest incidence is observed in the youngest age group, but this group is farthest removed in point of time from the influence of the "old" high fluoride domestic water.

With approximately 9 years of exposure to the risk of dental caries, only 6 deciduous molars were carious, or 9 percent of the 66 deciduous molars present in the 17 children born prior to the change in the water supply. In 21 children born within a year or two after the change to the river water and whose deciduous molars had approximately 6½ years of exposure to the risk of dental caries, 31 were carious, or about 22 percent of the 141 deciduous molars present. And in 19 children born 3 and 4 years after the water change and with the shortest period of exposure to the risk, approximately 4½ years, 52 of these teeth showed carious involvement, or about 36 percent of the 143 deciduous molars present. The incidence of dental caries in the first permanent molars in the group born prior to the change in the water supply was no greater than that recorded in the group born subsequent to the change, irrespective of the fact that the exposure in the former group was nearly four times that of the latter group.

Statistical analyses of the differences in the observed rates of the 1938 survey, and also the 1940 study, were made and are shown in tables 1A and 2A. Attention is called to the fact that the critical ratios as shown apply to the observed caries experience only. In interpreting these ratios the greater or lesser years of exposure to the risk of dental caries should also be considered as an important variable.

1940 BAUXITE SURVEY

During the past two years much attention has been focused on the probable relationship of fluorine to dental caries. Continuing epidemiological studies have shown a markedly lessened prevalence of dental caries in communities where the fluoride (F) concentration of the public water supply is slightly over the minimal threshold for endemic dental fluorosis, one part per million.

Although the number of school children available for study at Bauxite was limited,[7] this community seemed to offer some possibility of studying the mechanism of this phenomenon under the conditions of changed exposure to domestic waters differing widely in fluoride concentration. Primarily, the study was planned to determine the amount of dental caries in a population having a moderate to severe type of mottled enamel but which for the past 12 years had been consuming a domestic water free of fluorides. It seemed important also to include an estimation of the number of oral *L. acidophilus* in the saliva of as many as possible of the children included in the study.

[7] The general population of Bauxite is estimated at about 1,900.

TABLE 1A.—*Test of statistical significance of differences noted in the percentage of deciduous molars showing dental caries experience and first permanent molars showing dental caries experience among Bauxite (Ark.) children born subsequent to and prior to the change in the common water supply.*

[Based on table 1]

Group	Deciduous molars			First permanent molars		
	Percentage showing dental caries experience	Is the difference between the indicated pairs of percentages statistically significant?	Critical ratio [1]	Percentage showing dental caries experience	Is the difference between the indicated pairs of percentages statistically significant?	Critical ratio [1]
1. 40 children born subsequent to the water change (ages 6–9).	29	(1) and (2), yes	4.51	44	(1) and (2), no	0.17
2. 42 children born prior to the water change (ages 10–15).	9	(2) and (1), yes	4.51	43	(2) and (1), no	.17
3. 19 children born subsequent to the water change (ages 6–7).	36	(3) and (4), yes	2.63	42	(3) and (4), no (3) and (5), yes (3) and (6), no	.47 2.20 1.87
4. 21 children born subsequent to the water change (ages 8–9).	22	(4) and (3), yes	2.63	46	(4) and (3), no (4) and (5), yes (4) and (6), no	.47 2.68 1.36
5. 18 children born prior to the water change (ages 10–12).				24	(5) and (3), yes (5) and (4), yes (5) and (6), yes	2.20 2.68 4.28
6. 24 children born prior to the water change (ages 13–15).				57	(6) and (3), no (6) and (4), no (6) and (5), yes	1.87 1.36 4.28

[1] A critical ratio of 2 or more is generally accepted as indicating a difference that is statistically significant, that is, the difference is unlikely to be due to chance. In terms of probability it may be stated that a critical ratio of 2 denotes that a difference as great or greater than the one found may occur by chance only 4.5 times in 100 trials; for critical ratios of more than 2 the probability is even less than 4.5. Thus, when the critical ratio is 2 or more the cause or causes of the difference may be assigned to factors other than chance. (Compare, Pearl, R.: Introduction to Medical Biometry and Statistics, 2d ed., W. B. Saunders Co., Philadelphia, 1938. Table B, page 439.)

METHOD OF SAMPLING

The population studied was divided[8] in the following manner:

Group 1.—This division constituted the basic study group and consisted of all Bauxite pupils present on the day of sampling who had developed mottled enamel while using the "old" Bauxite water supply. They were mostly pupils in the high school and the higher elementary grades and ranged in age from 14 to 22 years. This group consisted of 50 individuals, 26 of whom gave a history of continuous exposure to the Bauxite common water supply. The remaining 24 were persons who had also developed mottled enamel while using the "old" Bauxite water but whose water histories included minor breaks in continuity of exposure. Attention is particularly called to the fact that all in this group showed a relatively moderate to severe type of mottled enamel. Group 1 is shown in table 2 under section B.

[8] All sampling was conducted by one of us (H. T. D.).

Group 2.—This group consisted of 49 children, ages 8–13 years, with a history of continuous use of the Bauxite common water supply. Included were 26 children, ages 8–10, born more than 1½ years after the change in the water supply, and 23 children, ages 11–13 years, born within 1½ years of the water change. This latter group of 23 children is designated in table 2, section A, as the "transitional group." Among these 49 children, two cases of "very mild" mottled enamel were observed. For purposes of convenience section A of table 2 also lists older pupils with a history of continuous use of the Bauxite common water supply. The older age group, 14–19 years, shown in section A is composed of the 26 pupils referred to in group 1 as those having continuously used the Bauxite water supply.

Group 3.—In order to have a group roughly comparable in age to group 1 (section B of table 2) all Benton (Ark.) high school pupils with a history of continuous use of the Benton common water supply were examined. There were 45 pupils in this group. As has been previously noted, the Bauxite group who had developed mottled enamel while using the "old" high fluoride water (table 2, section B) had been using Saline River water for the past 12 years only; the Benton group (section C of table 2) had used Saline River water throughout life. No mottled enamel was observed in any of the Benton pupils.

CLINICAL AND BACTERIOLOGICAL FINDINGS

The clinical examinations and the bacteriological estimations were made by Consultant Philip Jay (assistant professor, University of Michigan School of Dentistry) and Passed Assistant Dental Surgeon F. A. Arnold, Jr., United States Public Health Service. A mouth mirror and double end No. 3 explorer were used in making all clinical examinations. These examinations were not made independently as in the case of Dean and McKay (table 1) but each child was examined by the two examiners. When it was questionable as to whether a lesion was to be classified as dental caries or not, agreement between examiners was reached at the time of the examination and the diagnosis in which both concurred was recorded.[9] All mottled enamel diagnoses were made by Passed Assistant Dental Surgeon Arnold. The findings with respect to dental caries experience, using the first permanent molars for comparison, are shown in table 2.

[9] Comparison of incidences of dental caries in single age groupings or combinations of similar age groupings should not be made between the 1938 and the 1940 survey for the reason that the clinical examinations were made by different examiners. Under such conditions, and especially with regard to the pits and fissures observed in endemic areas of dental fluorosis, the inherent variation associated with subjective assessment results in some individual differences in the diagnosis of dental caries.

TABLE 2.—*Dental caries findings in Bauxite (Ark.) elementary and high school pupils with and without mottled enamel and exposed to a fluoride-free water for the past 12 years, and in Benton (Ark.) high school pupils exposed to a fluoride-free water throughout life. (Survey made April 22–27, 1940)*

Age in years, last birthday	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
A. 75 BAUXITE (ARK.) PUPILS WITH HISTORY OF CONTINUOUS USE OF COMMON WATER SUPPLY																
	26 pupils using fluoride-free water throughout life A-1			23 pupils of transitional group [1] A-2			26 pupils using fluoride-free water past twelve years only; high fluoride water previously A-3									Total
Number of pupils examined	3	15	8	11	7	5	3	3	6	6	7	1	0	0	0	75
First permanent molars:																
Number (missing included)	12	60	32	44	28	20	12	12	24	24	28	4	----	----	----	300
Number showing dental caries experience	6	47	15	21	9	1	3	3	15	7	10	3	----	----	----	140
Percent showing dental caries experience		65			34			25		46		39		41		
Number of pupils, caries free	1	1	2	2	4	4	1	2	0	3	1	0	----	----	----	----
Percent of pupils, caries free		15			43			50		25		27		13		
Approximate number of years of risk of exposure to caries		3.2			5.7						10.5					
Mottled enamel:																
Number of pupils with	0	1	0	0	1	0	3	3	6	6	7	1	----	----	----	----
Degree of clinical affection (weighted average) [2]	0	0.1	0	0	0.2	0	2.7	3.7	3.8	3.2	3.7	4.0	----	----	----	----

B. 50 BAUXITE (ARK.) PUPILS SHOWING A RELATIVELY MODERATE TO SEVERE TYPE OF MOTTLED ENAMEL. GROUP CONSISTS OF 26 OF "A-3" ABOVE AND 24 OTHERS WITH MINOR VARIATIONS IN CONTINUITY OF USE OF PUBLIC WATER SUPPLY										
Number of pupils examined	4	8	12	9	9	4	3	0	1	50
First permanent molars:										
Number (missing included)	16	32	48	36	36	16	12	0	4	200
Number showing dental caries experience	3	12	32	11	17	7	0	----	1	83
Percent showing dental caries experience		31		51			37			
					42					
Number of pupils, caries free	2	3	0	4	1	2	3	----	0	15
Percent of pupils, caries free					30					
Approximate number of years of risk of exposure to dental caries					10.8					
Mottled enamel:										
Number of pupils with	4	8	12	9	9	4	3	----	1	----
Degree of clinical affection (weighted average) [2]	3.0	3.0	3.8	3.1	3.8	3.5	3.7	----	4.0	----

C. 45 BENTON (ARK.) HIGH SCHOOL PUPILS WITH A HISTORY OF CONTINUOUS USE OF THE COMMON WATER SUPPLY. (NO CHANGE OCCURRED IN BENTON WATER SUPPLY DURING LIFETIME OF THIS GROUP)										
Number of pupils examined	11	9	10	9	4	0	1	1	0	45
First permanent molars:										
Number (missing included)	44	36	40	36	16	----	4	4	----	180
Number showing dental caries experience	30	27	20	33	13	----	0	1	----	124
Percent showing dental caries experience		71		70			58			
					69					
Number of pupils, caries free	1	1	3	0	0	----	1	0	----	6
Percent of pupils, caries free					13					
Approximate number of years of risk of exposure to dental caries					9.9					
Mottled enamel:										
Number of pupils with	0	0	0	0	0	----	0	0	----	----
Degree of clinical affection (weighted average) [2]	0	0	0	0	0	----	0	0	----	----

[1] The public water supply at Bauxite was changed from deep well to filtered river water in May 1928; the "transitional group" includes those pupils born within 1½ years of the change in water supply (a 3-year period covering 1½ years prior to the change and 1½ years subsequent to the change).

[2] The following weights were given to the diagnosis recorded for each individual: normal, 0; questionable, 0.5; very mild, 1; mild, 2; moderate, 3; severe, 4.

TABLE 2A.—*Test of statistical significance of differences noted in the percentage (a) of first permanent molars showing dental caries experience and (b) of pupils with caries free, first permanent molars, among certain groups of Bauxite and Benton (Ark.) school children*

[Based on table 2]

Group	First permanent molars			Pupils examined		
	Percentage showing dental caries experience	Is the difference between the indicated pairs of percentages statistically significant?	Critical ratio [1]	Percentage of pupils, caries free, first permanent molars	Is the difference between the indicated pairs of percentages statistically significant?	Critical ratio [1]
A-1. 26 Bauxite pupils using river water throughout life (ages 8–10).	65	A-1 and A-2, yes..	4.56	15	A-1 and A-2, yes..	2.25
		A-1 and A-3, yes..	3.89		A-1 and A-3, no ..	1.07
		A-1 and B, yes.....	3.94		A-1 and B, no.....	1.57
		A-1 and C, no.....	.69		A-1 and C, no.....	.23
A-2. 23 Bauxite pupils of the "transitional group" (ages 11–13).	34	A-2 and A-1, yes..	4.56	43	A-2 and A-1, yes..	2.25
		A-2 and A-3, no ..	.73		A-2 and A-3, no...	1.19
		A-2 and B, no.....	1.32		A-2 and B, no.....	1.07
		A-2 and C, yes....	5.81		A-2 and C, yes....	2.61
A-3. 26 Bauxite pupils using river water during the past 12 years only; deep well water previously (ages 14–22).	39	A-3 and A-1, yes..	3.89	27	A-3 and A-1, no ..	1.07
		A-3 and A-2, no ..	.73		A-3 and A-2, no...	1.19
		A-3 and C, yes....	5.09		A-3 and C, no.....	1.39
B. 50 Bauxite pupils showing a relatively moderate to severe mottled enamel (includes A-3 plus 24 others with some variation in use of water supply).	42	B and A-1, yes....	3.94	30	B and A-1, no.....	1.57
		B and A-2, no.....	1.32		B and A-2, no.....	1.07
		B and C, yes.....	5.50		B and C, yes.....	2.08
C. 45 Benton pupils with a history of continuous use of the common water supply. (No changes in this supply throughout lifetime of group.)	69	C and A-1, no.....	.69	13	C and A-1, no.....	.23
		C and A-2, yes....	5.81		C and A-2, yes....	2.61
		C and A-3, yes....	5.09		C and A-3, no.....	1.39
		C and B, yes.....	5.50		C and B, yes.....	2.08

[1] See footnote, table 1A.

Ordinarily dental caries experience rates are not determined for such small groups, 50 and 45 individuals, or for even much larger groups with such wide age distributions as shown in sections B and C of table 2. But with the reservation implied when dealing with a sample of this nature, the dental caries experience rate, for the permanent teeth, in the 50 Bauxite pupils with mottled enamel was 314 per 100 children; the 45 Benton pupils with no mottled enamel showed a rate of 675. The data upon which these rates are based are shown in table 3.

A previous study (*2*) has shown that the use of a domestic water with a fluoride concentration (1.8 p. p. m.) not greatly in excess of the minimal threshold for endemic dental fluorosis (1.0 p. p. m.) was associated with unusually low oral lactobacilli counts. Whether the observed effects were the result of local, systemic, or even structural or compositional factors in the teeth themselves is not known. Bauxite presented the opportunity of studying bacteriologically a group of children whose teeth were moderately to severely affected by mottled

enamel (an enamel which presumably should contain a higher than average fluorine content (*17*)), but who had not used the high fluoride water for the past 12 years. To ascertain whether or not such teeth, with presumably a high fluorine content of the enamel, would be found associated with a lowered number of lactobacilli in the saliva seemed an important step in the attempt to elucidate the manner in which this mechanism operates. For this purpose stimulated saliva samples were collected from 140 of the 149 pupils examined at Bauxite and Benton and quantitative estimations of the number of oral *L. acidophilus* were made by two of the authors (P. J. and F. A. A.). The technique used was similar to that described by Jay (*18*), making equal dilutions of all salivas before plating (1 cc. saliva to 4 cc. broth). The results of the bacteriological study are shown in table 4.

TABLE 3.—*Distribution of the dental caries experience, permanent teeth, in the Bauxite group with mottled enamel (section B, table 2) and the Benton group with no mottled enamel (section C, table 2) (1940 survey)*

Place	Number of pupils examined	Untreated dental caries	Past dental caries (fillings)	Extraction indicated	Missing	Total dental caries experience
		Number				
Bauxite	50	107	21	0	29	157
Benton	45	179	72	11	42	304
		Number per 100 cases				
Bauxite		214	42	0	58	314
Benton		398	160	24	93	675

TABLE 4.—*Summary of the L. acidophilus findings in the saliva from 41 Benton (Ark.) and 99 Bauxite (Ark.) pupils*

Item		Distribution of children according to the estimated number of *L. acidophilus* per cc. of saliva								
		Negative	Less than 100	100 to 1,000	1,000 to 3,000	3,000 to 12,000	12,000 to 21,000	21,000 to 30,000	30,000 and over	Total
Benton pupils without mottled enamel (ages 14–21 years).	Number	7	4	7	3	3	4	3	10	41
	Percent	17.1	9.7	17.1	7.3	7.3	9.7	7.3	24.5	100.0
Bauxite pupils with mottled enamel (ages 14–22 years).	Number	13	10	0	2	10	3	0	12	50
	Percent	26	20	0	4	20	6	0	24	100.0
Bauxite transitional group—born within 1½ years of water change (ages 11–13 years).	Number	10	4	3	3	1	0	0	2	23
	Percent	43.5	17.4	13.0	13.0	4.4	0	0	8.7	100.0
Bauxite children born 1½ years or more after change in water supply (ages 8–10 years).	Number	4	2	4	3	0	1	2	10	26
	Percent	15.4	7.7	15.4	11.5	0	3.8	7.7	38.5	100.0

DESCRIPTION[10] AND MINERAL COMPOSITION OF THE BAUXITE AND BENTON COMMON WATER SUPPLIES

Bauxite.—Since May 25, 1928, the Bauxite common water supply has been obtained from the Saline River. Pumps at the river deliver the water to the purification plant through approximately 6½ miles of 6-inch, and ½ mile of 4-inch pipe. The raw water is discharged into a mixing chamber of the over- and-under baffle type and is coagulated with about 0.3 grain per gallon each of sodium aluminate and aluminum sulfate. After mixing, the water flows into a sedimentation basin; the detention period is from 7 to 8 hours. The settled water then passes through a rapid sand filter to a small clear well from which it is pumped to a covered metal tank. Filter wash water is obtained from a 50,000-gallon covered metal elevated tank. Just after the filtered water leaves the pump a dose of about 0.5 p. p. m. of chlorine is added. The treated water flows from the storage tank to the mains by gravity.

The original domestic water supply of Bauxite was obtained from shallow wells and a few springs. With the increase in population and contamination of certain of these surface supplies, a new water supply became necessary, and in 1909 two 297-foot wells were drilled. One of these wells became partly filled at the bottom from caving, and in September 1925 a new 245-foot well was added. The public water supply was obtained from these two deep wells until the use of the filtered river water began in May 1928. At the time of the 1938 survey the 245-foot well was still being used for industrial purposes; the other well had been abandoned. Water from this deep well may be pumped into the distribution system, but it would have necessitated the repair of a relift pump and manipulation of a one-gate valve. There was no record of this having been done since the installation of the filtered river water in 1928. Practically all of the population uses the common water supply.

Benton.—The Benton public water supply is obtained from the Saline River. The present plant was placed in operation in 1936 but Benton has obtained its public water supply from the Saline River for more than 20 years, a period longer than the lifetime of the group examined. A pump delivers the river water through ⅝ mile of 8-inch pipe to a one million gallon settling tank, which is divided in half so that it may be cleaned and still provide settling facilities. From the settling tank the water flows by gravity through ⅝ mile of 8-inch line to the purification plant. Lime and aluminum sulfate, each in doses of 0.15 to 0.2 grains per gallon, are added in a small mixing chamber which is equipped with a mechanical mixer. From the mixing chamber the water flows under a baffle to the sedimentation basin, the deten-

[10] The description of the water supply used at present at Bauxite and Benton was supplied by Dr. W. B. Grayson, State Health Officer, Arkansas State Board of Health.

TABLE 5.—*Analyses of the waters used at Bauxite and Benton, Ark., in parts per million*

	[1] 1928		[2] 1938		[3] 1940	
	Bauxite deep-well water	Bauxite filtered water (Saline River)	Bauxite 245-foot deep well	Bauxite filtered water (Saline River)	Bauxite filtered water (Saline River)	Benton filtered water (Saline River)
Total residue on evaporation	1003.0	86.0	958.6	60.0	74.0	78.8
Loss on ignition	43.0	14.0	27.4	10.6	11.2	16.2
Fixed residue	960.0	72.0	931.2	49.4	62.8	62.6
Silica (SiO_2)	18.6	6.0	13.6	5.8	5.0	6.0
Iron (Fe)	1.0	.3	.1	.02	0.04	0.06
Aluminum (Al)			.4	0	0	0
Calcium (Ca)	25.3	17.6	30.9	11.4	14.6	17.4
Magnesium (Mg)	7.0	2.1	8.8	3.7	2.9	3.1
Sodium and potassium (calculated as Na)			333.4	2.9	4.7	3.4
Sodium (Na)	344.6	9.6				
Potassium (K)	9.2	3.4				
Carbonate (CO_3)	1.2	0	0	0	0	0
Bicarbonate (HCO_3)	258.2	63.4	247.6	47.5	62.8	62.2
Sulfate (SO_4)	39.6	15.7	36.0	10.3	8.9	8.1
Nitrate (NO_3)	.3	.03	0	.27	0.11	0.16
Chloride (Cl)	415.9	3.75	389.5	3.0	1.5	1.0
Phosphate (PO_4)			.1	0	0	0
Boron (B)			.8	0		
Fluoride (F)	[4]	[4]	14.1	0	[5] 0	[5] 0

[1] Samples collected in July 1928. [2] Samples collected in March 1938. [3] Samples collected in May 1940.
[4] These 1928 samples were recently analyzed (October 1940) for fluoride content by one of us (E. E.) who found that the deep well water contained 13.0 parts per million of fluorides (F), the filtered river water, 0.1 part per million.
[5] Two additional monthly samples from each locality (Bauxite and Benton), collected in June and July 1940, were also examined for fluoride. The results were negative, as in the May samples. The limit of the sensitivity of the fluoride test employed may be considered as about 0.1 part per million. (Pub. Health Rep., **48**: 1219–1222 (Oct. 6, 1933).) Assistant Chemist C. G. Remsburg carried out the determinations other than fluoride and boron, using mostly the methods given in the Standard Methods of Water Analysis of the American Public Health Association. The phosphate was determined colorimetrically by an adaptation of the Benedict and Theis method (J. Biol. Chem., **61**: 63 (1924)). The boron determinations were made essentially by the method of Foote (J. Ind. Eng. Chem., Anal. Ed., **4**: 39 (Jan. 15, 1932)).

tion period being approximately 6 hours. The water from the sedimentation tank then flows through two rapid sand filters, only one filter being used at a time. The wash-water is obtained from the system and is pumped for the backwash pressure. Liquid chlorine is added as the water leaves the filters for the 100,000-gallon covered clear well. The water is pumped from the clear well to a 75,000-gallon covered metal elevated tank and the distribution system.

Mineral composition.—The mineral composition of the common water supplies, based upon samples collected in 1928, 1938, and 1940, is given in table 5.

DISCUSSION

Because of the limited number of observations possible in a small population, the findings of this study must be interpreted with considerable caution. But it does seem from the data presented that the factor responsible for the marked inhibition of dental caries in areas of endemic dental fluorosis may be operative for a considerable period after the group has ceased using the high fluoride water supply. Whether this factor functions locally, systemically, or both ways, is not known.

A first inspection of table 2 might suggest that those pupils with moderate to severe dental fluorosis are less liable to attack by dental caries than those not so affected. A comparison, for instance, of section B with section C (table 2) shows that in a group roughly comparable as regards age, the 50 Bauxite pupils with endemic dental fluorosis, but using a water for the past 12 years similar to that used by the 45 Benton high school pupils during their entire lifetime, have experienced markedly less dental caries in their first permanent molars, 42 percent and 69 percent, respectively. In the Bauxite pupils 15, or 30 percent, were free of caries in all first molars; at Benton, only 6, or 13 percent, had no dental caries.

But the mechanism associated with this limited immunity from dental caries does not seem to be wholly dependent, if at all, upon the presence or absence of macroscopic dental fluorosis. The "transitional group" at Bauxite, born within 1½ years of the change in the water supply and in whom only one case of "very mild" dental fluorosis was observed, also show an inhibition of dental caries when compared with the younger children. Similar observations by Dean and McKay in the 1938 survey, as shown in table 1, indicate that there was some factor inhibiting the development of dental caries in the deciduous molars of those children in Bauxite who were born prior to the change in the water supply. It does not seem logical to explain this observed difference on the basis of the presence or absence of macroscopic dental fluorosis, since no positive diagnosis of dental fluorosis was made on any of the deciduous teeth in this group. These observations on the deciduous teeth are in accord with the findings of Dean (*1*) on six communities with varying amounts of fluorides in the communal water supplies. The 1940 observations at Bauxite with respect to the first permanent molars are in accord with the results reported by Dean, Jay, Arnold, McClure, and Elvove (*2*) for Galesburg, Ill., where no marked difference was found in the children with dental fluorosis compared to those who were not so affected.

In respect to the bacteriological findings, attention may be called to the following points:

First, the enamel of the teeth of all of the Bauxite pupils, ages 14–22 years (section B, table 2), revealed the distinctive hypoplastic signs of dental fluorosis, with the discreet and confluent pitting symptomatic of the severest forms of mottled enamel being common.[11] The teeth of the 45 Benton students, on the other hand, were free of mottled enamel, and showed a type of calcification commonly considered normal. The percentage of high *L. acidophilus* counts (30,000 and over) in both the Bauxite group and the Benton group was approxi-

[11] The excellent photographs taken by McKay (*14*, *15*) attest the severity of the mottled enamel developed by the users of the "old" water supply.

mately the same. An examination of the number of low counts (0 and less than 100) shows 26.8 percent of the Benton group in this category in contrast with 46 percent of the Bauxite group. This difference borders on statistical significance, but the limited number of observations do not warrant any definite conclusions.

Second, the "transitional group" (those born within 1½ years of the water change) shows the lowest amount of dental caries; the youngest Bauxite group (ages 8–10 years), the highest. An analysis of the difference between the low counts recorded for these two groups indicates a statistically significant difference with a critical ratio of 2.88.

An analysis of the data presented in tables 1 and 2 might suggest that certain physiological effects, at least insofar as they relate to the inhibitory influence on dental caries, had carried over in the Bauxite population for several years after the change from the high fluoride water to the fluoride-free water. This seemingly would apply to both the older group with mottled enamel and to the "transitional group" as well. The possibility of physiological effects being carried over in a population several years after cessation [12] of exposure to waters of high fluoride content obviously requires much additional study.

Another question that naturally arises is whether or not the enamel of certain teeth, despite the absence of macroscopic dental fluorosis, contains more fluorine than the enamel of similar teeth calcified in a community whose public water supply for a number of years has been free of fluorides. Specifically, these are the deciduous teeth (table 1) calcified under the conditions existing in Bauxite prior to or shortly after the change in the water supply and the permanent teeth of the "transitional group" (table 2). With respect to Bauxite, of course, much of this study material is no longer available for biochemical analyses, but continuing studies of selected communities from the time that the water supply is changed may shed some light on this particular aspect of the question.

[12] From the standpoint of descriptive epidemiology it seems relevant to note that there is no evidence that the population was actually using a fluoride-free water immediately after the introduction of the filtered river water in 1928. This water, although fluoride-free when analyzed in 1938 and 1940, may possibly have contained very small amounts of fluoride during the first few years of its use because of incrustations in the iron pipes of the distribution system, cooking utensils, etc. As noted in the footnote to table 5, a recent analysis of the sample of the 1928 "filtered river water" received at this laboratory in July 1928, showed a fluoride (F) content of 0.1 part per million. It is not possible, however, to learn whether this sample was taken from a tap on the distribution system or from the treatment plant installed a few months before the collection of the sample. A personal communication, however, from Mr. L. R. Branting, superintendent of the Republic Mining & Manufacturing Co., dated October 25, 1940, states that after checking with the laboratory personnel, it seemed to be the consensus that the 1928 sample of filtered river water was taken from a tap in the laboratory. He notes that the community had been using the filtered river water for several months at the time that the sample was collected and that there would have been no particular reason in going to the filter plant when it was possible to collect the sample at the company's chemical laboratory at the administration building. The influence, if any, of this variable cannot, of course, be precisely assessed on the present evidence; the best possible information now available, however, suggests that the 1928 filtered river water sample was collected from a tap on the distribution system.

In an attempt to interpret these observed effects, particularly as regards the "transitional group," the possibility of a placental or mammary transfer, or both, of the factor or factors associated with the dental caries inhibition, must be given careful consideration. In this connection it might be remarked that the transfer of fluorine by placental or mammary means has been presumed on the basis of epidemiological evidence (*4*, *19*, *20*, *21*, *22*) and demonstrated experimentally (*23*, *24*, *25*), although other workers (*26*, *27*) have been unable to demonstrate the mammary transfer of fluoride in cow's milk.

It is apparent that much additional study of this phenomenon is needed to elucidate the manner in which this limited immunity from dental caries operates. The partial inhibition of dental caries, moreover, may be only a part of a larger problem in general physiology relative to the continued ingestion of varying amounts of fluorides by general population groups.

Two findings of this study seem worthy of stressing:

1. The older Bauxite group, all of whom showed a moderate to severe type of endemic dental fluorosis, disclosed markedly less dental caries than a comparable group at Benton who were free of mottled enamel.

2. The cumulative increase in the amount of dental caries experience concomitant with increasing years of exposure to risk did not hold true in the Bauxite school population studied. The reversal in trend of this epidemiological constant suggests the noticeable physiological influence which operated in this population and which was presumably associated with the change in the communal water supply.

SUMMARY

1. Bauxite pupils with moderate to severe mottled enamel and exposed to fluoride-free waters during the past 12 years showed markedly less dental caries than a comparable group of Benton pupils without mottled enamel who had been using a fluoride-free water during their lifetime.

2. This limited immunity from dental caries is seemingly not dependent upon the presence of macroscopic mottled enamel because children born within several years of the change in the water supply and practically free of mottled enamel likewise disclosed a low dental caries experience.

3. The youngest age group at Bauxite—those farthest removed in time from the influence of the "old" high fluoride water—shows the highest dental caries experience in spite of the fact that they had been exposed to risk of caries for the shortest period of time.

4. The *L. acidophilus* counts apparently reflect a difference in caries activity in the several groups studied, a result which is seemingly consistent with the clinical findings in these groups.

5. Teeth moderately to severely affected with mottled enamel showed no tendency to rampant dental caries even though they had been exposed to a fluorine-free water for the past 12 years.

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A FURTHER STUDY OF THE RORSCHACH TEST APPLIED TO DELINQUENTS

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This is the third and final article dealing with the relationship of various factors to the Rorschach test as applied to a group of 476 prisoners admitted to the United States Northeastern Penitentiary during the fiscal year 1935–36. The first article dealt with the age factor (*1*). The second was concerned with marital status (*2*). The current study takes up the remaining ten factors analyzed, namely, offense, education, occupation, national descent, continuity of the home, body build, educational grade status, mental age, Woodworth personal data scores, and psychiatric diagnosis. Interrelationships among various intrinsic test factors such as reaction time and total scores are also reported.

A detailed description of the experimental group, together with a discussion of the procedure used in giving the test and in scoring it, will be found in a preceding article (*1*). Suffice it to say the subjects were quite representative of the institutional population as a whole. Neither do they differ markedly from the 11,170 male admissions to Federal penal and correctional institutions for the corresponding fiscal year as to age, marital status, education, and race (*3*). There is some

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divergence for offense, counterfeiters making up 23.7 percent of the experimental group in contrast to 9.2 percent for all Federal prisoners, and Internal Revenue Act and liquor law violators making up only 22.9 percent in contrast to 46.1 percent for all Federal prisoners. Comparable data for occupation, continuity of the home, body build, educational grade status, mental age, responses to the Woodworth personal data sheet, and psychiatric diagnosis were not available for all the Federal offenders. In all probability if such data could be obtained a close similarity would be noted, close enough to warrant the assumption that the present findings in regard to the Rorschach test might also apply to any group selected from among all male admissions to Federal prisons and reformatories.

The relationships among various factors were studied by the use of three statistical techniques. If both variables were of the continuous type, the familiar Pearson's product-moment coefficient of correlation was determined. If one variable was continuous and the other distributed in more than two categories, or if both occurred in two or more categories, the coefficient of contingency was computed as outlined by Guilford (*4*). Finally, if one variable was continuous and the other could be forced into two categories, the biserial coefficient of correlation was determined as described by Dunlap (*5*).

EXTRINSIC FACTORS

Although no one has yet succeeded in defining what is meant by personality, it is apparently the resultant of numerous functions and subject to numerous influences. In the present instance offense is a factor of considerable importance. All criminals are not alike. The suave fake oil stock promoter is far different from the hillbilly moonshiner. There seems to be a definite tendency for certain types of individuals to drift toward a particular type of crime. Offense should, therefore, bear some relationship to the personality of antisocial individuals.

While it may be true that heredity determines the predisposition toward the development of a certain type of personality, it cannot be denied that what we are born with is subject to modification under the molding influence of education. Therefore, education is a factor worth investigating in its relationship to personality.

Occupation is another factor to be investigated in its relationship to personality. Individuals tend to pick out lines of endeavor suitable to their personalities. A quiet, taciturn man is not likely to choose salesmanship as a career; conversely, a sociable, talkative individual is not apt to apply for a job as lighthouse keeper.

Nationality is also a factor that should be considered in a study of personality. National differences do exist. The phlegmatic Swede

can hardly be mistaken for a volatile southern European, nor the stolid Slav for an aggressive Prussian.

The importance of the continuity of the home in the development of personality has been stressed by many authors. It seems logical to assume that a child from a home broken by the death, separation, or divorce of the parents feels insecure and by virtue of that insecurity may acquire abnormal traits of personality. Therefore, the continuity of the home is a factor worth consideration in a study of personality.

The relationship of body type to personality has received considerable attention by numerous investigators. Kretchmer popularized the concept that the introverted individual is generally the tall, thin, asthenic type and the extroverted individual is generally the short, broad, pyknic type. The body build factor is therefore justifiably included in any personality study.

Educational grade status, mental age, and score on the Woodworth personal data sheet purport to be objective measures of educational achievement, intellectual capacity, and certain abnormal mental traits, respectively, all of which are aspects of personality. The three objective measures may, consequently, be added to the list of factors related to personality.

Since psychiatric diagnosis is essentially a classification of personalities emphasizing certain abnormal categories it, too, may be added to the list of factors related to personality.

If all these factors are related to personality, it stands to reason that any test which claims to be an objective measure of personality should show some degree of relationship to one or more of these factors. The Rorschach method is described as an objective approach to a study of personality and, therefore, should correlate with some of the factors selected.

Intercorrelations among extrinsic factors.—The various extrinsic factors may be related to one another, thereby showing a common relationship to the Rorschach test. Intercorrelations among these various factors are shown in table 1.

A significant relationship occurs in the following instances based on the assumption that a coefficient of correlation is significant if it exceeds four times the probable error: (1) Age versus marital status, offense, occupation, national descent, body build, and psychiatric diagnosis; (2) marital status versus offense, occupation, national descent, body build, Woodworth personal data responses, and psychiatric diagnosis; (3) offense versus education, occupation, national descent, body build, educational grade status, mental age, Woodworth personal data responses, and psychiatric diagnosis; (4) education versus occupation, national descent, body build, educa-

tional grade status, mental age, and psychiatric diagnosis; (5) occupation versus national descent, body build, educational grade status, mental age, and psychiatric diagnosis; (6) national descent versus body build, educational grade status, mental age, Woodworth personal data responses, and psychiatric diagnosis; (7) body build versus educational grade status, mental age, Woodworth personal data responses, and psychiatric diagnosis; (8) educational grade status versus psychiatric diagnosis; (9) Woodworth personal data responses versus psychiatric diagnosis.

TABLE 1.—*Correlations* [1] *among extrinsic factors studied in relationship to Rorschach test scores*

Factor	Marital status	Offense	Education	Occupation	National descent	Continuity of home	Body build	Educational grade status	Mental age	Woodworth personal data	Psychiatric diagnosis
Age	0.45	0.43	*−0.01	0.25	0.32	**−0.06	0.30	*−0.02	*−0.02	*0.00	0.33
Marital status	.....	.30	.11	.20	.26	.04	.41	.12	.09	.18	.32
Offense	.....	.....	.30	.29	.35	.10	.24	.26	.28	.21	.34
Education	.....	.....	.....	.38	.26	**.04	.15	*.35	*.32	*−.01	.43
Occupation	.....	.....	.....	.....	.40	.07	.14	.42	.36	.12	.32
National descent	.....	.....	.....	.....	.....	.07	.24	.43	.41	.23	.43
Continuity of home	.....	.....	.....	.....	.....	.....	.05	**.10	**.14	**.09	.09
Body build	.....	.....	.....	.....	.....	.....	.....	.15	.17	.17	.25
Educational grade status	.....	.....	.....	.....	.....	.....	.....	.....	*.86	*.00	.49
Mental age	.....	.....	.....	.....	.....	.....	.....	.....	.....	*.00	.62
Woodworth personal data	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.39

[1] The coefficients of correlation include the conventional Pearson's *r*, indicated by single asterisks, the biserial *r* indicated by double asterisks, and the coefficient of contingency indicated by the figures without asterisks. Probable errors range from 0.02 to 0.04.

A highly significant correlation (0.60 or higher) occurs only in two instances, educational grade status versus mental age, and mental age versus psychiatric diagnosis. In other words, the Stanford achievement test is essentially another intelligence test or else the Army intelligence tests in reality measure educational achievement. Psychiatric diagnosis, as far as prisoners are concerned, still leans heavily upon intellectual status.

Intercorrelations between extrinsic and intrinsic factors.—Correlations between extrinsic factors and reaction times appear in table 2.

There are no highly significant correlations between reaction times and the various extrinsic factors. However, certain directional tendencies do exist. Postal-law violators, skilled laborers, individuals of German descent, individuals of athletic body build, the well educated, and the intelligent tend to give the speediest responses. On the other hand, liquor law violators, common laborers, colored persons, individuals of pyknic body type, and the feeble-minded tend to give the slowest responses.

TABLE 2.—*Intercorrelations* [1] *between extrinsic factors and reaction times to Rorschach test cards*

Reaction time to card No.—	Offense	Education	Occupation	National descent	Continuity of home	Body build	Educational grade status	Mental age	Woodworth personal data	Psychiatric diagnosis
	C	*r*	*C*	*C*	*rbi*	*C*	*r*	*r*	*r*	*C*
1	0.17	−0.02	0.10	0.27	0.01	0.11	−0.03	−0.08	0.01	0.17
2	.16	−.02	.14	.16	.02	.15	−.05	−.01	.00	.12
3	.13	−.01	.14	.26	.01	.12	−.03	.00	.01	.12
4	.23	−.02	.14	.24	.20	.14	−.01	−.01	.00	.16
5	.22	−.01	.16	.20	.02	.10	−.01	.04	−.01	.24
6	.20	−.02	.12	.13	−.02	.10	−.06	−.05	.00	.11
7	.14	−.02	.20	.17	−.03	.10	−.07	−.09	−.01	.12
8	.15	−.02	.12	.19	−.03	.14	−.02	.01	−.01	.17
9	.22	−.02	.17	.13	−.09	.11	−.05	−.10	−.01	.09
10	.19	−.01	.17	.16	.13	.10	−.01	.02	.00	.14

[1] The conventional coefficient of correlation (Pearson's) is indicated by the symbol *r*, the biserial coefficient by *rti*, and the coefficient of contingency by *C*. Probable errors range from 0.02 to 0.05.

The correlations between extrinsic factors and various total scores obtained on the Rorschach test are presented in table 3.

TABLE 3.—*Correlations* [1] *between various extrinsic factors and total Rorschach test scores*

Total scores	Offense	Education	Occupation	National descent	Continuity of home	Body build	Educational grade status	Mental age	Woodworth personal data sheet	Psychiatric diagnosis
	C	*r*	*C*	*C*	*rbi*	*C*	*r*	*r*	*r*	*C*
Total responses	0.21	0.18	0.24	0.16	−0.03	0.14	0.24	0.35	0.01	0.23
Popular, unweighted	.15	.09	.20	.20	.01	.16	.11	.16	−.01	.23
Popular, weighted	.21	−.07	.20	.25	−.04	.17	.09	.02	−.01	.24
Original	.17	.13	.26	.18	−.04	.13	.20	.21	.02	.26
Whole	.24	.14	.19	.21	−.05	.14	.17	.19	.01	.19
Detail	.17	.44	.25	.23	−.17	.13	.63	.57	.01	.22
Unusual detail	.14	.05	.02	.15	.02	.11	.40	.22	.03	.10
Form	.23	.16	.24	.16	−.08	.17	.24	.28	.01	.24
Motion	.12	.05	.10	.08	.04	.09	.24	.59	.01	.09
Color	.09	.04	.17	.07	.02	.06	.25	.54	.01	.02
Animal	.25	.16	.18	.18	−.08	.16	.16	.16	−.01	.19
Animal anatomy	.20	.12	.17	.22	−.04	.09	.20	.33	−.01	.22
Human	.15	−.02	.13	.10	.10	.10	.46	.41	.02	.18
Human anatomy	.19	.09	.23	.13	−.09	.11	.25	.32	.01	.20
Inanimate objects	.18	.04	.18	.15	.10	.09	.16	.26	.02	.15
Abstract	.11	.06	.07	.09	.01	.08	.21	.46	.01	.13
Analysis of cards:										
General to detail	.11	.08	.15	.16	.07	.11	.27	.54	−.01	.19
Detail to general	.07	.03	.05	.14	.01	.03	.21	.57	.01	.13
General only	.18	.03	.11	.16	−.13	.12	−.03	−.11	.01	.17
Detail only	.17	.06	.17	.11	−.08	.11	.07	−.11	.01	.11

[1] The conventional Pearson's coefficient of correlation is indicated by the symbol *r*, the biserial coefficient by *rbi*, and the coefficient of contingency by *C*. Probable errors range from 0.02 to 0.04.

Offense shows some relationship to all total scores except motion, color, analysis of cards by the general to detail and detail to general methods. There are no highly significant correlations, but there are certain directional tendencies. Postal-law violators tend to have the highest scores in all categories except for unusual detail, color, human, human anatomy, and abstract responses. They also show a greater

tendency to analyze cards by the general to detail and detail to general methods. Violators of the Dyer Act show the highest scores for unusual detail, color, and human anatomy responses; while counterfeiters exceed the others in the total number of human responses and the number of cards analyzed by the detail method only.

Education correlates to a moderate extent with total, original, whole, detail, form, and animal responses, the highest correlation being with detail replies. The tendency is for educated individuals to give a higher number of responses in all categories except for popular weighted and human. No highly significant correlations were found.

Occupation bears a modest but not a highly significant relationship to all total scores except unusual detail, motion, abstract, and analysis of cards by the detail to general and general only methods. The professional and clerical groups tend to give the highest number of responses in all categories except for popular weighted and unusual detail. They also show a preference for analysis of cards by the general to detail and detail to general methods. On the other hand, common laborers show the lowest total scores in all categories except for popular weighted and unusual responses in which they excel all other occupational types.

National descent correlates to a certain, but not highly significant, degree with all total scores except motion, color, human, abstract, and analysis of cards by the detail method only. Persons of English descent tend to show the highest popular weighted score; those of Scandinavian descent seem to prefer analysis of cards by the detail to general methods; those of German extraction obtain the highest scores for general to detail analysis of cards, animal anatomy, human, abstract, and unusual detail responses; and those of Jewish parentage have the highest scores in all other categories of responses.

Germans show the lowest total scores for analysis of cards by the detail to general method, detail only method of analysis, total number of detail responses, and animal responses. This is rather surprising. One would expect the Germans to be methodical and therefore attentive to details. The Italians obtain the lowest scores for color and motion responses. This is another odd finding. Color and motion are supposed to measure emotion. One would expect more lability of the emotions in southern Europeans and hence higher color and motion responses. Negroes show the lowest total scores in all other categories.

A history of a home disrupted by death, separation, or divorce of parents does not correlate positively with any of the total scores to any significant degree. There is a slightly significant negative relationship with total detail responses and analysis of cards by the general method only. The directional tendency is for lower total scores in all instances except for popular unweighted, unusual detail,

motion, color, human, inanimate object, abstract, and analysis of cards by the general to detail and detail to general methods.

Body build bears a mild relationship to all total scores except motion, color, animal anatomy, human, human anatomy, inanimate objects, abstract, and analysis of cards by any of the four methods. No highly significant correlations occur. In general, individuals of athletic body type obtain the highest scores in all instances except for popular weighted responses, whole, form, and analysis of cards by the detail method only. Persons of pyknic body type tend to give the highest number of popular weighted responses while those of asthenic body type give the highest number of whole and form responses.

Educational grade status shows some degree of positive relationship to all total scores except popular responses, both weighted and unweighted, and analysis of cards by the general or detail methods only. There is a high correlation between educational grade status and detail responses and a relatively high correlation between educational grade status and human responses.

Intelligence shows some degree of positive relationship to all total scores except popular weighted and analysis of cards by the general and detail methods only. In fact, for the latter there is almost a significant negative relationship. In general, intelligence shows a higher degree of correlation with the various total scores than any other extrinsic factor studied. This is particularly noticeable for detail, motion, color, and analysis of cards by the general to detail and detail to general methods.

The Woodworth personal data scores do not correlate with any of the intrinsic Rorschach test factors. This is a disappointing finding. Theoretically, the two techniques should have something in common since both purport to measure personality traits.

Psychiatric diagnosis reveals no highly significant correlation, but shows some relationship to all total scores except unusual detail, motion, color, and analysis of cards by the detail to general and detail only methods. Individuals diagnosed as simple adult maladjustment tend to have the highest scores for popular unweighted, color, animal anatomy, motion, total, and analysis of cards by the detail to general and general to detail methods of analysis. Psychopathic personalities tend to have the highest popular weighted score. Neurotics have the highest scores in all other categories. Simple adult maladjustment is associated with the lowest popular weighted score. Mental deficiency shows the lowest scores for analysis of cards by all methods except detail only, whole, color, animal anatomy, human anatomy, unusual detail, and total responses. Psychopathic personalities show the lowest scores in all the rest of the categories.

As Hertz (*6*) points out in her historical summary, validation of the Rorschach test has been to a great extent in terms of comparisons

between Rorschach diagnoses and case studies or general qualitative impressions rather than in terms of statistical techniques. The relationship of intelligence to Rorschach test factors has received considerable attention with equivocal results. Likewise, the few studies of nonintellectual factors using correlational methods have not been very profitable. Therefore, as far as the relationship of extrinsic factors to the Rorschach test is concerned, the present findings are in concurrence with those of the majority of statistical investigations reported in the literature.

INTRINSIC FACTORS

Reaction times and primary responses according to formula are shown in table 4.

TABLE 4.—*Reaction times and percentage distribution of primary responses to the Rorschach test cards according to formula*

	Card No.									
	1	2	3	4	5	6	7	8	9	10
	Reaction time in seconds									
Range	1–43	2–65	2–62	2–52	1–57	1–47	2–80	2–40	2–86	1–70
Quartile 1	5.7	7.9	8.0	7.4	5.5	8.7	11.7	7.4	12.9	7.3
Quartile 2	8.2	11.8	11.7	10.8	8.4	15.6	18.2	10.3	18.6	10.2
Quartile 3	11.8	19.6	18.9	16.3	12.6	31.6	33.7	13.8	33.6	14.4
Mean	9.9	14.9	14.6	12.2	10.4	18.6	21.2	11.3	21.5	12.8
	Primary response (percent)									
Whole, form, animal	75.2	38.4	.....	11.6	79.2	14.9	.....	.....	.....	.....
Whole, form, animal anatomy	.....	.....	.....	58.6	.....	31.9	.....	.....	.....	.....
Whole, form, human	.....	.....	39.1	.....	.....	.....	.....	.....	.....	.....
Whole, form, inanimate object	.....	.....	.....	.....	.....	.....	22.4	.....	.....	.....
Detail, form, animal	.....	17.2	.....	.....	.....	.....	.....	74.6	.....	62.4
Detail, form, human anatomy	.....	.....	10.5	.....	.....	.....	.....	.....	12.0	.....
Nothing	.....	23.5	22.7	18.1	.....	44.9	55.5	.....	55.5	16.4
All other	24.8	20.9	27.7	11.7	20.8	8.3	22.1	25.4	32.5	21.2

In summarizing the findings a typical representative of the experimental group, based on averages and highest frequencies, would give the following primary responses and have the following reaction times: Card No. 1, bat, 9.9 seconds; card No. 2, nothing 14.9 seconds; card No. 3, two men, 14.6 seconds; card No. 4, hide, 12.2 seconds; card No. 5, butterfly, 10.4 seconds; card No. 6, nothing, 18.6 seconds; card No. 7, nothing, 21.2 seconds; card No. 8, two animals, 11.3 seconds; card No. 9, nothing, 21.5 seconds; and card No. 10, crabs, 12.8 seconds.

Total scores obtained by the experimental group are shown in table 5.

TABLE 5.—*Total scores on Rorschach test*

Total Rorschach test scores	Quartile 1	Quartile 2	Quartile 3	Highest score	Mean
Responses (total)	11.5	12.9	15.6	49	13.9
Popular (unweighted)	10.3	11.5	13.2	27	11.3
Popular (weighted)	505.6	672.5	819.8	1,173	627.5
Original	.6	1.6	3.8	30	2.5
Nothing (no response)	1.5	2.8	4.3	10	2.6
Whole	4.4	6.2	7.9	18	5.9
Detail	3.2	4.9	7.2	34	5.3
Unusual detail (small, white space, etc.)	.3	.5	.8	2	.1
Form	8.1	10.7	14.2	49	11.2
Motion	.3	.6	.9	5	.2
Color	.3	.5	.8	6	.1
Animal	4.8	6.5	8.3	18	6.3
Animal anatomy	1.1	1.9	3.1	16	1.8
Human	.5	1.2	1.6	6	.7
Human anatomy	.4	.9	2.5	15	1.1
Inanimate objects, landscapes, etc.	.6	1.2	2.3	14	1.3
Abstract	.3	.5	.8	8	.2
Analysis of cards:					
General to detail	.3	.6	.9	7	.3
Detail to general	.3	.6	.9	3	.2
General only	3.6	4.9	6.0	10	4.3
Detail only	2.3	3.0	3.9	9	2.7

The total scores of a typical representative would be as follows, leaving out decimal places: Responses, 14; popular (or vulgar), 11; original, 3; whole, 6; detail, 5; form, 11; animal, 6; animal anatomy, 2; human, 1; human anatomy, 1; inanimate objects, 1; and unusual detail, motion, color, or abstraction, 1. He would analyze 4 cards by seeing the pictures as a whole, 3 cards by seeing details only, and one card by seeing the picture first as a whole only, and then proceeding to details or vice versa. In two cards he would say that he saw nothing at all; in two others he would say that he saw nothing, but would later spontaneously change his mind. If he showed any "color shock" at all, it would be to card No. 2, where a splotch of red is added, rather than to card No. 8, the first in the series which is entirely colored.

Harriman (7), in a study of 100 college students, compares his findings with those of Rorschach for normal individuals and those of Beck for feeble-minded children. These comparisons are shown in table 6 together with the corresponding norms for the present experimental group.

TABLE 6.—*Comparison of Rorschach test scores*

Scores	Rorschach's normal group	Harriman's college group	Beck's feeble-minded group	Author's delinquent group
Mean total responses	15.0–30.0	52.0	21.6	13.9
Mean whole	8.0	11.1	----------	5.9
Mean detail	23.0	33.0	----------	5.3
Mean rare and white space detail	3.0	3.7	----------	.1
Mean motion	----------	4.3	.8	.2
Mean color	1.5–3.5	2.7	2.4–3.8	.1
Mean anatomy (animal and human)	----------	3.5	----------	2.9
Percentage animal	60.0	39.3	55.4	45.2
Percentage good form	70.0–80.0	78.0	57.8	71.3
Percentage original	----------	25.0	35.8	18.0

At this point there is a great temptation to become speculative. Why is there such an obvious difference between delinquents and nondelinquents and what does it signify? The unproductiveness of the former is certainly not due to feeblemindedness. Therefore, there must be some other explanation. Perhaps antisocial individuals are lacking in imagination. They do not care about the less tangible things of life. What they want is something readily perceived by the senses, such as material wealth and possessions. The Rorschach test reveals this lack of imagery in poor productivity. The high percentage of good form interpretations also tends to confirm the emphasis upon concreteness.

The tendency toward taking a bird's-eye view of a given situation and paying little attention to detail is reflected in the preponderance of whole over detail responses. The average prisoner does not display logical thinking, that is, proceeding from detail to general observations or vice versa. He prefers to jump at conclusions by seeing situations as a whole or else seizes upon details without coming to any general conclusions. Obviously, if he were a logical thinker he would stop to weigh the gain against the consequences of antisocial behavior instead of being blinded by the prospect of immediate profit.

The practical absence of color and motion responses indicates that the average delinquent has an arrested emotional development. This may account for the indifference of antisocial individuals to ethical standards set up by society. Incidentally, the tendency toward emotional indifference was noted in a study of male prisoners by the Neymann-Kohlstedt test (*8*). Their scores reached a peak in the middle zone of the curve of distribution instead of showing the normal bimodal disposition of scores into extratensive and intratensive characteristics. In other words, delinquents are neither extroverts nor introverts.

One might speculate further, but a much simpler explanation for the paucity of responses can be advanced. In the first place, the rigid standardization of the test procedure undoubtedly cut down on the number of responses. In the second place, prisoners are naturally inhibited by suspicion of anyone who is on the other side of the fence. This barrier between prisoners and personnel is difficult to break down. Therefore, despite assurances to the contrary, many of the present subjects probably failed to cooperate because of the fear that the examiner was trying "to get something on them." The scarcity of motion and color responses may be accounted for to a certain extent by the simplification of scoring.

Intercorrelations among the various reaction times are shown in table 7. As may be readily perceived, there is no correlation among the ten Rorschach test cards as far as reaction time is concerned. In

all instances four times the probable error exceeds the coefficient of correlation.

TABLE 7.—*Intercorrelations* [1] *among reaction times to the Rorschach test*

Card No.	2	3	4	5	6	7	8	9	10
1	0.08	0.05	0.05	0.00	0.07	0.06	0.00	0.07	0.03
2		.09	.12	.08	.08	.04	.06	.05	.08
3			.08	.06	.05	.03	.05	.02	.05
4				.06	.08	.04	.04	.05	.05
5					.05	.07	.02	.08	.02
6						.02	.06	.02	.05
7							.06	.00	.04
8								.07	.04
9									.04

[1] The coefficients are all the conventional Pearson's *r*. Probable errors are uniformly 0.03.

Intercorrelations among the various total scores are presented in table 8.

For purposes of discussion the intercorrelations among the various total scores may be divided into three groups: (1) Those in which the coefficient of correlation is less than four times its probable error, indicative of no significant relationship; (2) those in which the coefficient of correlation exceeds four times its probable error, but is less than 0.60, indicative of a significant relationship; and (3) those in which the coefficient of correlation is 0.60, or higher, indicative of a highly significant relationship.

Based on the above classification the following factors show a significant correlation: (1) Total responses versus popular unweighted, whole, unusual detail, motion, color, animal anatomy, human, human anatomy, inanimate objects, abstract, analysis of cards by the detail to general and detail only methods; (2) popular unweighted versus popular weighted, whole, detail, form, animal anatomy, human, human anatomy, and analysis of cards by the detail to general and general only methods; (3) original versus whole, unusual detail, motion, color, animal, animal anatomy, human, human anatomy, inanimate objects, abstract, analysis of cards by the detail to general and detail only methods; (4) whole versus detail, unusual detail, motion, color, animal, animal anatomy, human, human anatomy, inanimate objects, abstract, analysis of cards by the general to detail and detail to general methods; (5) detail versus motion, animal anatomy, human, human anatomy, inanimate objects, analysis of cards by the general to detail and detail to general methods; (6) unusual detail versus form, color, animal, animal anatomy, human, human anatomy, inanimate objects, abstract, and analysis of cards by the general to detail, detail to general and detail only methods; (7) form versus motion, animal anatomy, human, human anatomy, inanimate objects, abstract, and analysis of cards by all four methods; (8) motion versus animal anatomy, human, human anatomy, inani-

TABLE 8.—*Intercorrelations* [1] *among total Rorschach test scores*

Factor	Popular, unweighted	Popular, weighted	Original	Whole	Detail	Unusual detail	Form	Motion	Color	Animal	Animal anatomy	Human	Human anatomy	Inanimate objects	Abstract	Analysis of cards, general to detail	Analysis of cards, detail to general	Analysis of cards, general only	Analysis of cards, detail only
Total responses	0.50	−0.32	0.72	0.57	0.84	0.31	0.80	0.35	0.16	0.61	0.52	0.33	0.48	0.52	0.21	0.60	0.36	0.03	0.30
Popular, unweighted		.38	−.11	.34	.51	−.05	.51	.03	−.09	.61	.38	.18	.18	.11	−.18	.03	.18	.13	.08
Popular, weighted			−.63	−.26	−.30	−.24	−.35	−.27	−.15	−.05	−.18	−.13	−.38	−.35	−.31	−.32	−.19	−.01	−.28
Original				.49	.66	.33	.65	.38	.22	.38	.41	.30	.47	.59	.35	.61	.33	−.07	.30
Whole					.29	.13	.76	.31	.15	.49	.40	.38	.30	.51	.17	.42	.21	.64	−.05
Detail						.01	.92	.14	−.06	.68	.54	.25	.47	.36	.02	.41	.17	−.11	.66
Unusual detail							.28	.05	.13	.13	.14	.14	.18	.25	.22	.27	.22	−.18	.16
Form								.29	.11	.72	.56	.39	.48	.51	.14	.22	.32	.35	.45
Motion									.01	.04	.17	.38	.16	.27	.10	.30	.01	.11	.01
Color										.00	.05	.01	.05	.25	.37	.15	.05	.07	−.07
Animal											.29	.24	.11	.18	.08	.35	.21	.23	.34
Animal anatomy												.17	.21	.20	.06	.37	.62	.18	.22
Human													.11	.12	.09	.29	.09	.24	.04
Human anatomy														.19	.05	.34	.12	.12	.47
Inanimate objects															.16	.51	.32	.13	.01
Abstract																.26	.11	.06	.09
Analysis of cards:																			
General to detail																	.17	.44	.01
Detail to general																		−.14	−.02
General only																			−.22

[1] Coefficients are all the conventional Pearson's *r*. Probable errors range from 0.01 to 0.03.

mate objects, and analysis of cards by the general to detail method; (9) color versus inanimate objects, abstract, and analysis of cards by the general to detail method; (10) animal versus animal anatomy, human, inanimate objects, and analysis of cards by all four methods; (11) animal anatomy versus human, human anatomy, inanimate objects, and analysis of cards by the general to detail, general only, and detail methods only; (12) human versus analysis of cards by the general to detail and general only methods; (13) human anatomy versus inanimate objects and analysis of cards by the general to detail and detail only methods; (14) inanimate objects versus abstract, and analysis of cards by all methods except detail only; (15) abstract versus general to detail method of analysis; (16) general to detail method of analysis versus detail to general and general only methods of analysis.

A significant negative relationship exists among the following factors: (1) Total responses versus popular weighted; (2) popular unweighted versus abstract; (3) popular weighted versus whole, detail, unusual detail, form, motion, color, animal anatomy, human, human anatomy, inanimate objects, abstract, and analysis of cards by all methods except general only; (4) unusual detail versus analysis of cards by the general method only; (5) detail to general analysis of cards versus general analysis only; (6) general analysis of cards only versus detail analysis only. The negative correlation of weighted popular responses with other total scores is due largely to the high proportion of "nothing" responses which, of course, could not be classified according to the various categories.

Highly significant positive correlations were obtained for the following factors: (1) Total responses versus original, detail, form, animal, and analysis of cards by the general to detail method; (2) popular unweighted versus animal; (3) original versus detail, form, and general to detail method of analysis; (4) whole versus form and analysis of cards by the general method only; (5) detail versus form, animal, and analysis of cards by the detail method only; (6) form versus animal; (7) animal anatomy versus detail to general method of analysis. The only highly significant negative correlation occurs between popular weighted responses and original.

These intercorrelations do not agree entirely with those of Hertz (*9*) who made a similar study of Rorschach test factors using 300 students as her subjects. She reports that the whole answer factor shows the highest correspondence with movement, color score, and percentage of good original answers; that the movement factor is best related to good original, items (total responses), and whole answers; that the color score is positively related to percentage of good original and whole, but negatively related to percentage of animal responses; that the factor of animal responses shows a negative

relationship to all other factors, especially with percentage of original, color, and whole answers; and finally that the items (total responses) factor is best related to movement and originality. The present findings confirm the relatively higher degree of relationship of original and total responses to the movement factor, and of color and total responses to originality.

There is no very satisfactory method of determ ning the reliability of the Rorschach test from a statistical standpoint. Administering a parallel series of ink-blots or repeating the test has certain disadvantages. The test cards differ from each other to such an extent that the split-half method of testing for reliability is open to question. Rorschach did not intend each card to measure exactly the same factors. However, as Hertz points out, the split-half method is about the only technique that is available. Using this method she found the test to be a reliable instrument with her group of junior high school students (*9*). She points out that her findings disagree with those of Vernon, who worked chiefly with college students.

The current investigation tends to confirm Vernon's opinion that the Rorschach test is unreliable, as may be seen by reference to table 9. Hertz, quoting Vernon, states that the coefficients of correlation between the two halves of the test should be at least 0.70–0.80 for the chief categories of response if the test has any claim to objective validity. In that case the only factors that the Rorschach test measures consistently, according to the present findings, are originality, total responses, and form.

TABLE 9.—*Correlations* [1] *between total scores for the first 5 cards and the total scores for the last 5 cards of the Rorschach test*

Scores	Coefficient of correlation	Scores	Coefficient of correlation
Total responses	0.66	Animal anatomy	0.38
Popular, unweighted	.34	Human	.13
Popular, weighted	.31	Human anatomy	.33
Original	.74	Inanimate objects	.48
Whole	.38	Abstract	.50
Detail	.50	Analysis:	
Unusual detail	.27	General to detail	.26
Form	.66	Detail to general	.32
Motion	.30	General only	.15
Color	.45	Detail only	.12
Animal	.38		

[1] Coefficients of correlation are the conventional Pearson's *r*. Probable errors range from .01 to .03.

SUMMARY AND CONCLUSIONS

1. The use of the Rorschach ink-blot test in a study of Federal delinquents at the United States Northeastern Penitentiary is reported.

2. The test was applied under rigidly standardized situations and scoring was made as objective as possible.

3. Under these conditions the test was found to be statistically unreliable except in measuring original, total, and form responses.

4. A high degree of positive correlation (0.60 or higher) occurred between the following total scores: (1) Total responses versus original, detail, form, animal, and analysis of cards by the general to detail method; (2) popular unweighted versus animal; (3) original versus detail, form, and general to detail method of analysis; (4) whole versus form and analysis of cards by the general method only; (5) detail versus form, animal, and analysis of cards by the detail method only; (6) form versus animal; (7) animal anatomy versus detail to general method of analysis. The only highly significant negative correlation occurs between popular weighted responses and original.

5. Correlations among sundry extrinsic factors and various intrinsic test factors revealed only six coefficients above 0.50, namely, educational grade status versus total detail responses; mental age versus total detail, color, and motion responses; and mental age versus analysis of cards by the general to detail and detail to general methods.

6. Applied as a measuring instrument, comparable to psychometric techniques, the Rorschach test is unsatisfactory in the routine examination of delinquents.

7. The Rorschach test is therefore not a test, but as Dr. Wells puts it, "an art, in which ink-blots are instruments in the same sense as the sculptor's chisel or the artist's pen."

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ORNITHODOROS VIGUERASI, A NEW SPECIES OF TICK FROM BATS IN CUBA (ACARINA: IXODOIDEA)[1]

By R. A. Cooley, *Entomologist*, and Glen M. Kohls, *Assistant Entomologist*, *United States Public Health Service*

Larval, nymphal, and adult specimens of a very interesting new bat tick have been received from Cuba. It is named *Ornithodoros viguerasi* in honor of the collector, Dr. I. Pérez Vigueras, University of Habana, Habana, Cuba.

ADULT

Body.—Oval, broadest at about the middle, narrowly rounded behind, and a little pointed in front. Broad anterior point bent ventrad where it meets the anterior extensions of the supracoxal folds, from which it is separated by a depressed line. Length, 3.12 mm.; width, 2.1 mm.

Mammillae.—Numerous and of various sizes and forms. Those in the median dorsal area large, crowded, of irregular shapes, flattened on top and each with a central pit which may bear a hair; those in the anterior marginal areas on the dorsum much as in the median area but smaller and with the hairs more frequent; on the venter with a distinct transverse band extending from side to side just posterior to coxae IV, in which the mammillae are unique among all known species. The ends of this band extend over the lateral margins to the dorsum and are visible from above. It also has anterior extensions onto the supracoxal folds and in the median area between the coxae. At the margins these mammillae are elevated, columnar, about twice as high as their diameters, convex on top and each with a single fine hair; height of the mammillae diminishing progressively from margins to the median area where they are only slightly elevated and yet retain a sharp margin of the convex top, which readily distinguishes them from the nearby mammillae. The surface of the derm between these modified mammillae is finely and evenly pebbled.

Discs.—Large, distinct, a little depressed and with their surfaces shining; not apparent on the venter.

Legs.—With numerous barbed hairs which are shorter and more barbed on the dorsal surfaces, larger and less barbed on ventral surface. Surface shining and with transverse wrinkles. Length of tarsus I, 0.42 mm.; metatarsus, 0.3 mm. Length of tarsus IV, 0.50 mm.; metatarsus, 0.4 mm. Subapical dorsal projections and dorsal humps absent.

Coxae.—Coxae I and II a little separated; all other coxae contiguous.

Hood.—No well-developed hood is present though the anterior

[1] From the Rocky Mountain Laboratory, Hamilton, Mont., Division of Infectious Diseases, National Institute of Health.

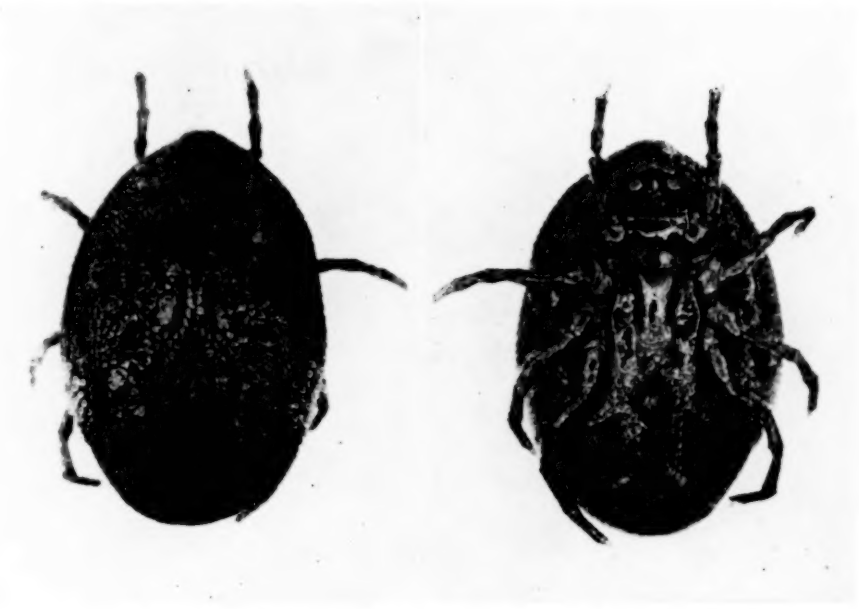

FIGURE 1.—*Ornithodoros viguerasi* n. sp. Adult, dorsal and ventral view.

projection of the dorsal body wall is bent downward and resembles a hood, affording some protection for the mouth parts.

Cheeks.—Conical projections about as long as the diameter at the base and bearing a few short, fine hairs.

Capitulum.—Basis capituli with the surface irregular but shining, with a median longitudinal elevation. Only the anterior portion of the basis capituli is visible in the type female and it is not evident whether the capitulum is protrusile in the adult as in the nymph. Palpal article 1 is long, about as long as articles 2 and 3 combined. Article 4, conical.

Hypostome.—Small, flattened, in the shape of an inverted V; denticles not evident when examined *in situ*. Posthypostomal hairs placed far behind the insertion of the hypostome and very long. Length from hairs to apex, about 0.18 mm. (Described *in situ*.)

Folds and plates.—Coxal and supracoxal folds present. Coxal fold with a shining sclerotized plate bordering coxae II, III, and IV (see fig. 2). Supracoxal fold similarly sclerotized from opposite coxa III to the anterior end. There is also a similar plate anterior to the sexual opening between coxae I.

Grooves.—Preanal groove distinct at the sides but interrupted in the middle. Transverse postanal groove deep and continuous from the two lateral margins. Median postanal groove deep and terminating at the transverse postanal groove. Dorso-ventral groove absent.

Sexual opening.—At the level of the intervals between coxae I and II.

Eyes.—Absent.

Anus.—In an elliptical pattern.

NYMPH

Nymphs and adults are readily distinguishable. The late stage nymphs measure 3.0 by 1.95 mm. and differ from the adult in possessing a definite sclerotized plate posterior to the position of the sexual opening and in lacking a transverse plate between coxae I anterior to the sexual opening found in the female. Late nymphs also differ from the female in having mammillae in the margins of the transverse band only about as much elevated as the other mammillae of this species. The first nymphal stage, without feeding since ecdysis from the larva, measures 2.85 by 1.95 mm., thus differing from the length of the female by only 0.27 mm. The first nymphal stage lacks the transverse band of modified mammillae. The late nymphal stages lack also the definite modification of mammillae in the posterior median margin of the dorsum as described in the adult.

In the nymphs the capitulum is very long, protrusile, and attached by a soft "neck." When extended the capitulum reaches beyond the anterior point of the body.

Hypostome.—Pointed apically, broad at the base, the two post-hypostomal hairs arising from the tumescent base. The denticles are faint, scarcely visible even in mounted specimens. Length about 0.15 mm.

Nymphs are misleading in appearing to have a sexual opening. This

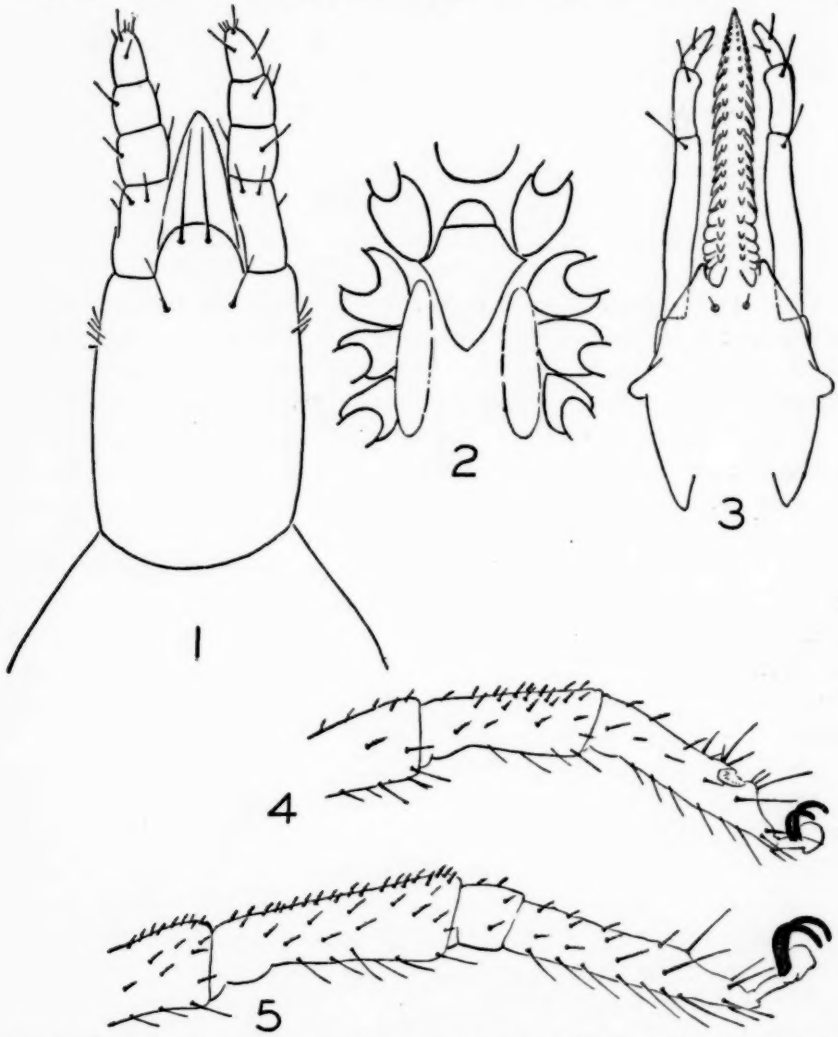

FIGURE 2.—*Ornithodoros viguerasi* n. sp. 1. Nymph, capitulum, ventral view. 2. Nymph, ventral view showing sclerotized plates and coxae. 3. Larva, capitulum, ventral view. 4. Nymph, tarsus and metatarsus of leg I. 5. Nymph, tarsus and metatarsus of leg IV.

is due to a sclerotized semicircular flap and just posterior to it a large, smooth, sclerotized plate (see fig. 2). Coxal folds have oval sclerotized plates bordering on coxae II, III, and IV, but the supracoxal folds are mammillated and lack the long, definite sclerotized plates found in adults.

LARVA

Specimens described as larvae are from large fed larvae which later molted into nymphs of this species.

Engorged larva (not necessarily fully fed) oval, widest in front of the middle, bluntly pointed in front, rounded behind. Length (not including the mouth parts) 2.64 mm., width 1.95 mm.

Larval derm striated as in other species but lacking the dorsal patch with a different pattern of markings found in some species. Leg I distant from the insertion of the mouth parts. Legs separated by about the same distance as that from leg I to the mouth parts.

Basis capituli long with a knob on each side and with two horns on the posterior lateral corners. Mouth parts very long and slender; mounted in balsam, articulation between palpal articles 1 and 2 not visible.

Hypostome long and narrow; length about 0.27 mm., denticles 2/2; principal denticles in the lateral files relatively long and sharp, except at the basal end where they are rounded and blunt; those of the median files small and short. Posthypostomal hairs very small and short.

It is notable that while the fed larva measures 2.64 mm. in length the one known adult measures only 3.12 mm.

Holotype, 17169, a female from bat cave, Cueva Somorrostro, near Jamaica, Cuba, September 19, 1940.

Paratypes, 17168, 1 nymph, September 19, 1940; 17164, 11 nymphs, September 20, 1940; 17172, 1 nymph, September 1940; 17277, 1 nymph, October 8, 1940; 17295, 3 nymphs, 4 larvae, from "bat." All are from Cueva Somorrostro, near Jamaica, Cuba. Dr. Vigueras informs us that the species of bat inhabiting this cave is *Phyllonycteris poeyi* Gundlach.

Paratypes have been placed in the United States National Museum, Washington, D. C., Museum of Comparative Zoology, Harvard University, Cambridge, Mass.; Division of Entomology and Parasitology, University of California, Berkeley, Calif.; and Division of Entomology and Economic Zoology, University of Minnesota, Minneapolis, Minn. The holotype and remaining paratypes are in the collection of the Rocky Mountain Laboratory.

PLAGUE INFECTION REPORTED IN THE UNITED STATES DURING 1940

IN HUMAN BEINGS

One human case of bubonic plague was reported in the United States during 1940. The case occurred in a boy, 13 years of age, living in Emmett, Gem County, Idaho. The onset of illness occurred on June 10, but the condition was not immediately recognized as

plague. The diagnosis was subsequently proved, however, bacteriologically and by animal inoculation. The patient recovered.

The locality in which this case was reported is close to the eastern counties of Oregon which are known to be infected with rodent plague. Investigation revealed that the patient had contact with rabbits and carniverous birds shortly before the onset of illness.

IN RODENTS AND PARASITES

Plague infection in wild rodents and parasites from rodents and from a rabbit was reported during 1940 in five Western States—California, Nevada, Oregon, Washington, and Wyoming. It was found for the first time in Park County, Wyo. Infection was demonstrated by the method of mass inoculation with emulsion of parasites, by laboratory examination, or by inoculation with tissue from infected animals.

Plague infection reported in wild rodents and parasites from rodents and rabbit

State and county	Date [1]	Infection found in—
California:		
San Bernardino County	July 15	Pool of 38 fleas from 21 golden mantled ground squirrels (*Citellus lateralis chrysodeirus*).
Do	July 24	1 ground squirrel (*C. beecheyi fisheri*).
Do	July 26	Pool of 29 fleas from 17 ground squirrels (*C. beecheyi fisheri*).
Do	July 30	Tissue from 4 ground squirrels (*C. beecheyi fisheri*).
Do	Aug. 13	Pool of 129 fleas from 15 ground squirrels (*C. beecheyi fisheri*).
Do	Aug. 20	Pool of 91 fleas from 44 golden mantled ground squirrels (*C. lateralis chrysodeirus*).
Nevada:		
Elko County	May 1	Tissue from 2 ground squirrels (*C. beldingi oregonus*) found dead; pool of 20 fleas from 6 ground squirrels (same species); and tissue from 1 ground squirrel (*C. richardsoni nevadensus*).
Oregon:		
Lake County	May 31	Marmot (*Marmota flaviventris*).
Washington:		
Lincoln County	May 28	Pool of 105 fleas from 21 ground squirrels (*C. washingtoni washingtoni*).
Do	May 29	159 fleas from 29 ground squirrels (*C. washingtoni washingtoni*).
Spokane County	May 27	Tissue and pool of 36 fleas from 1 ground squirrel (*C. columbianus columbianus*) found dead.
Do	May 29	Pool of 72 fleas from 21 ground squirrels (*C. columbianus columbianus*).
Do	May 31	Pool of 36 fleas from a cottontail rabbit (*Sylvilagus nuttallii nuttallii*).
Wyoming:		
Park County	July 5	Pool of 14 lice from 1 marmot (*M. flaviventris*). (First proof of plague infection in this county).
Sublette County	July 24	Pool of 65 fleas from 14 ground squirrels (*C. armatus*).
Do	Aug. 21	Tissue from 1 ground squirrel, pool of 54 fleas from 22 ground squirrels, and pool of 18 fleas from 14 ground squirrels (all *C. armatus*).
Do	Aug. 28	Pool of 15 fleas from 12 ground squirrels (*C. armatus*).

[1] Dates of reports that infection had been proved.

COURT DECISION ON PUBLIC HEALTH

Recovery of damages because of contraction of silicosis.—(Pennsylvania Supreme Court; *Rebel* v. *Standard Sanitary Mfg. Co.*, 16 A. 2d 534; decided December 4, 1940.) In an action to recover damages the plaintiff alleged that he had contracted silicosis while in the employ of the defendant company as a result of the latter's violation of the following provision of a Pennsylvania statute regulating

employment in industrial establishments: "Exhaust fans of sufficient power, or other sufficient devices, shall be provided for the purpose of carrying off poisonous fumes and gases, and dust from emery-wheels, grind-stones and other machinery creating dust." The plaintiff presented proof to the effect that although there were exhaust fans in the grinding and sand-blasting room they were not sufficient to carry off the dust in that room and that this deleterious substance permeated the atmosphere of the welding room where plaintiff was employed, which room was separated from the grinding and sand-blasting room by a 12-foot roofed alley.

The plaintiff prevailed in the trial court and the defendant appealed, its principal contention before the supreme court being that the statute added nothing to the responsibility of the employer or to the right of the employee and that, therefore, the plaintiff could not recover until he had shown the availability or practicability of more sufficient devices for the prevention of dust. With this argument the appellate court said that it could not agree. That this legislation, said the court, placed a definite responsibility upon the employer could not be successfully controverted, for it was well settled that a violation of the statute, which resulted in injury to the employee, made the employer liable in a common law action for damages. "There was no burden upon plaintiff to establish that more efficient devices than those used by defendant for the prevention of dust were available. All plaintiff was required to show was that the exhaust fans in use were not proper or sufficient compliance with the provisions of the statute."

Also the court was of the view that the defense of assumption of risk was not permissible, as there was nothing in the employment as a welder that presupposed any scientific knowledge "such as a knowledge of the properties of silica dust and their injurious effect upon the body."

Respecting the word "sufficient" used in the statute, the court stated that it was a relative term depending upon the facts of each case.

Another claim made by the defendant was that the above-quoted statute had no bearing upon the controversy since it had been repealed without a saving clause, but the court found no merit in this contention, saying that the vested right under the provisions of the statute which plaintiff had immediately upon the injury occurring in 1935 could not be impaired by the 1937 repealing statute. "It is well settled that the repeal of a statute cannot deprive a plaintiff of his cause of action under it for damages for injury either to person or property."

The judgment of the lower court in favor of the plaintiff was affirmed

DEATHS DURING WEEK ENDED FEBRUARY 15, 1941

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 15, 1941	Corresponding week, 1940
Data from 88 large cities of the United States:		
Total deaths	9,731	9,751
Average for 3 prior years	9,451	
Total deaths, first 7 weeks of year	69,321	67,941
Deaths under 1 year of age	478	534
Average for 3 prior years	544	
Deaths under 1 year of age, first 7 weeks of year	3,829	3,843
Data from industrial insurance companies:		
Policies in force	64,701,811	66,256,632
Number of death claims	12,490	12,586
Death claims per 1,000 policies in force, annual rate	10.1	9.9
Death claims per 1,000 policies, first 7 weeks of year, annual rate	10.6	10.4

SUMMARY OF MORTALITY IN 90 CITIES

Provisional Data for 52 Weeks Ended December 28, 1940, and Comparison With Data for 1939

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Provisional [1]		Final [2]
	1940	1939 [3]	1939
Total deaths, 90 cities	439,423	429,419	435,227
Deaths under 1 year of age	26,434	25,724	26,971
Infant mortality rate	39	41	40

[1] Based on weekly telegraphic reports from city health officers.
[2] Calendar year; based on transcripts received from State registrars' offices.
[3] Exclusive of data for Elizabeth and Sacramento.

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 22, 1941

Summary

With the single exception of measles, no unusual incidence or significant increase over last week was indicated by the current reports of the nine communicable diseases included in the following table.

The number of cases of influenza for continental United States dropped from 21,989 for the preceding week to 13,688. Alaska reported 2,059 cases as compared with 29 last week. The incidence of diphtheria, scarlet fever, smallpox, and typhoid fever was not only lower than that for the corresponding period of any of the preceding 5 years, but the numbers of cases of each of these diseases reported to date this year are below the cumulative totals for the corresponding period of each of the preceding 5 years. As these diseases apparently reached new low levels in 1940, the current incidence is especially favorable.

The incidence of measles for the current week increased 30 percent as compared with the preceding week, while the total number of cases reported this year to date is more than two and one-third times the 5-year (1936–40) median and over three times the number reported for the corresponding period last year. The highest incidence is in the Middle Atlantic, East North Central, South Atlantic, New England, and East South Central areas.

The incidence of poliomyelitis declined during the current week, but it is higher than in all but one (1940) of the preceding 5 years, while the cumulative total for the current year is above that for any of the preceding 5 years. For the current period, however, no State reported more than 3 cases.

Of 37 cases of smallpox, 31 cases, or 84 percent, were reported from the North Central States. Two cases of tularemia were reported in North Carolina; and of 20 cases of endemic typhus fever, 11 cases occurred in Georgia. The seasonal appearance of Rocky Mountain spotted fever in the Northwest is indicated by 1 case each in Montana and Wyoming.

The death rate for the current week for 92 major cities of the United States was 12.6 per 1,000 population, as compared with 13.6 for the preceding week and with a 3-year (1938–40) average of 13.1 (88 cities).

Telegraphic morbidity reports from State health officers for the week ended February 22, 1941, and comparison with corresponding week of 1940 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none were reported, cases may have occured.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40
	Feb. 22, 1941	Feb. 24, 1940		Feb. 22, 1941	Feb. 24, 1940		Feb. 22, 1941	Feb. 24, 1940		Feb. 22, 1941	Feb. 24, 1940	
NEW ENG.												
Maine	0	0	1	11	------	5	138	214	44	0	0	0
New Hampshire	0	0	0	16	------	------	15	49	24	0	0	0
Vermont	0	0	0	------	------	------	13	5	5	0	0	0
Massachusetts	1	4	4	------	------	------	376	292	357	4	1	2
Rhode Island	0	0	0	------	------	------	0	111	32	1	0	2
Connecticut	0	0	2	63	2	5	37	185	185	0	0	0
MID. ATL.												
New York	23	25	31	[1] 162	44	[1] 45	4,910	319	1,273	0	1	8
New Jersey	18	8	10	310	42	42	1,256	87	100	2	1	1
Pennsylvania	13	25	41	------	------	------	3,433	98	219	3	11	6
E. NO. CEN.												
Ohio	16	22	29	390	32	32	2,190	11	99	0	0	7
Indiana	13	13	13	29	66	66	226	5	11	0	0	0
Illinois	18	29	29	54	61	64	2,471	37	36	0	2	2
Michigan [2]	1	7	15	53	------	4	2,396	228	228	1	0	2
Wisconsin	2	1	1	273	183	183	662	312	312	0	0	1
W. NO. CEN.												
Minnesota	1	0	1	61	7	1	7	291	168	1	2	0
Iowa	7	4	4	300	42	14	195	158	66	1	1	1
Missouri	8	10	19	53	42	175	78	3	9	1	0	3
North Dakota	1	3	1	40	23	10	12	3	3	0	0	0
South Dakota	2	0	1	6	1	1	5	2	1	0	0	0
Nebraska	2	1	5	15	------	------	4	29	33	0	2	1
Kansas	3	10	9	45	78	22	272	417	20	0	3	0
SO. ATL.												
Delaware	1	0	0	------	------	------	216	1	21	0	0	0
Maryland [2]	2	0	5	103	107	107	77	4	136	2	0	2
Dist. of Col. [3]	1	5	10	18	8	8	59	2	8	1	0	1
Virginia	13	18	17	1,959	2,430	------	1,338	27	223	3	4	4
West Virginia [3]	5	8	9	294	1,733	131	112	13	13	3	1	3
North Carolina	10	10	23	435	64	173	343	124	124	0	0	2
South Carolina [3]	1	5	4	2,246	1,182	1,182	237	16	34	4	1	2
Georgia [3]	2	8	8	736	385	385	349	197	197	1	2	2
Florida [3]	1	6	6	127	38	35	145	65	65	0	0	0
E. SO. CEN.												
Kentucky	6	10	9	117	115	115	560	44	154	0	2	9
Tennessee	9	6	11	604	307	246	123	133	133	3	1	8
Alabama [3]	13	11	14	1,483	699	699	294	44	44	3	1	3
Mississippi [3]	1	9	6	------	------	------	------	------	------	1	0	1
W. SO. CEN.												
Arkansas	4	7	9	286	997	233	107	3	3	2	1	1
Louisiana [3]	5	6	14	96	110	24	5	18	18	0	0	2
Oklahoma	2	8	7	310	487	227	14	7	12	1	0	1
Texas [3]	31	44	38	1,910	3,448	754	463	414	310	2	1	6
MOUNTAIN												
Montana [4]	1	1	2	55	8	57	3	33	30	0	0	0
Idaho	1	1	1	------	1	7	12	186	44	0	0	0
Wyoming [4]	2	2	1	52	------	------	36	22	4	0	0	0
Colorado	7	8	8	61	35	------	147	32	32	0	0	1
New Mexico	1	1	1	32	19	6	85	1	21	1	0	0
Arizona	3	3	3	196	291	215	175	16	21	0	1	1
Utah [3]	2	0	0	43	19	------	8	273	155	1	0	0
Nevada	0	------	------	------	------	------	0	------	------	0	------	------
PACIFIC												
Washington	5	1	3	11	56	1	141	529	236	1	0	1
Oregon	0	6	2	41	37	84	235	351	28	1	0	0
California	8	23	32	[5] 592	705	705	99	408	408	1	3	3
Total	266	369	498	13,688	13,904	11,870	24,079	5,819	8,126	45	42	101
8 weeks	2,382	3,395	4,584	530,126	112,641	38,450	113,391	37,660	47,669	354	307	755

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 22, 1941, and comparison with corresponding week of 1940 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40	Week ended		Median 1936–40
	Feb. 22, 1941	Feb. 24, 1940		Feb. 22, 1941	Feb. 24, 1940		Feb. 22, 1941	Feb. 24, 1940		Feb. 22, 1941	Feb. 24, 1940	
NEW ENG.												
Maine	0	0	0	9	13	18	0	0	0	0	0	0
New Hampshire	0	0	0	4	1	16	0	0	0	0	0	0
Vermont	0	0	0	6	13	13	0	0	0	0	0	0
Massachusetts	0	1	0	105	105	241	0	0	0	1	1	1
Rhode Island	0	0	0	5	20	17	0	0	0	0	0	0
Connecticut	0	0	0	39	101	100	0	0	0	1	5	0
MID. ATL.												
New York	1	0	0	410	731	740	0	0	0	5	0	5
New Jersey	1	1	0	270	367	187	0	0	0	1	0	1
Pennsylvania	1	3	1	330	597	561	0	0	0	5	5	4
E. NO. CEN.												
Ohio	0	1	0	262	240	482	4	0	7	4	5	3
Indiana	1	1	1	167	186	217	2	0	8	0	4	1
Illinois	1	1	1	432	656	656	1	6	11	3	5	4
Michigan [2]	3	0	0	232	272	585	0	0	3	3	0	3
Wisconsin	1	5	0	139	174	338	4	6	6	0	4	1
W. NO. CEN.												
Minnesota	0	0	0	37	106	169	2	6	9	0	0	0
Iowa	0	1	0	55	102	178	10	9	34	1	7	1
Missouri	0	0	0	97	87	215	1	12	12	0	0	1
North Dakota	0	0	0	14	50	47	0	1	10	0	1	1
South Dakota	0	0	0	29	22	22	4	0	4	0	0	0
Nebraska	0	0	0	33	21	94	0	0	8	0	0	0
Kansas	0	2	0	45	82	209	3	0	9	1	2	0
SO. ATL.												
Delaware	0	0	0	16	13	6	0	0	0	0	0	0
Maryland [2]	0	0	0	65	43	53	0	0	0	1	0	0
Dist. of Col. [2]	0	0	0	18	25	20	0	0	0	0	0	1
Virginia	2	2	0	41	50	35	0	0	0	5	0	2
West Virginia [2]	0	2	0	37	56	51	0	0	0	0	2	3
North Carolina	2	1	1	47	36	36	0	0	0	0	0	4
South Carolina [3]	0	0	0	15	2	5	0	0	0	7	3	3
Georgia [3]	0	1	0	30	19	14	0	1	0	0	2	2
Florida [3]	3	0	1	5	4	6	0	0	0	1	2	1
E. SO. CEN.												
Kentucky	0	0	0	124	84	74	0	0	0	4	4	3
Tennessee	0	0	0	92	86	39	0	0	0	3	1	2
Alabama [3]	0	0	2	26	23	12	1	0	0	1	2	2
Mississippi [3]	1	2	0	8	10	10	0	0	0	1	1	1
W. SO. CEN.												
Arkansas	1	0	0	6	14	14	2	0	5	3	2	1
Louisiana [3]	1	0	0	8	12	14	0	0	0	1	7	7
Oklahoma	0	0	0	13	12	31	1	1	6	2	0	0
Texas [3]	2	3	1	41	53	87	1	4	4	4	5	5
MOUNTAIN												
Montana [4]	1	0	0	33	33	47	0	0	11	2	0	0
Idaho	0	0	0	10	14	19	0	0	4	0	0	0
Wyoming [4]	0	0	0	8	6	13	0	0	1	0	0	0
Colorado	0	0	0	25	81	73	1	17	14	2	0	0
New Mexico	0	0	0	5	13	24	0	1	0	0	1	0
Arizona	0	0	0	9	4	15	0	0	0	0	1	0
Utah [3]	1	0	0	3	26	37	0	0	0	1	0	0
Nevada	0	----	----	0	----	----	0	----	----	0	----	0
PACIFIC												
Washington	1	0	0	32	66	63	0	1	5	0	0	1
Oregon	0	0	0	9	24	45	0	0	4	1	2	2
California	2	3	1	151	156	219	0	0	9	3	4	4
Total	26	30	18	3,597	4,911	6,358	37	65	283	67	78	82
8 weeks	271	260	174	26,486	35,766	48,076	378	573	2,364	559	617	885

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended February 22, 1941, and comparison with corresponding week of 1940 and 5-year median—Con.

Division and State	Whooping cough	
	Week ended	
	Feb. 22, 1941	Feb. 24, 1940
NEW ENG.		
Maine	22	49
New Hampshire	0	6
Vermont	4	23
Massachusetts	172	124
Rhode Island	18	12
Connecticut	60	27
MID. ATL.		
New York	276	354
New Jersey	90	55
Pennsylvania	398	267
E. NO. CEN.		
Ohio	269	67
Indiana	13	24
Illinois	67	105
Michigan [2]	314	100
Wisconsin	146	97
W. NO. CEN.		
Minnesota	38	19
Iowa	38	9
Missouri	26	11
North Dakota	46	7
South Dakota	4	0
Nebraska	22	12
Kansas	129	39
SO. ATL.		
Delaware	5	4
Maryland [2]	82	153
Dist. of Col. [3]	7	24
Virginia	97	54
West Virginia [2]	34	43
North Carolina	368	65
South Carolina [3]	133	14
SO. ATL.—continued		
Georgia [3]	22	23
Florida [3]	7	8
E. SO. CEN.		
Kentucky	55	47
Tennessee	57	32
Alabama [3]	34	19
Mississippi [2]	----------	----------
W. SO. CEN.		
Arkansas	44	10
Louisiana [3]	2	30
Oklahoma	22	1
Texas [3]	340	111
MOUNTAIN		
Montana [4]	24	4
Idaho	28	44
Wyoming [4]	3	6
Colorado	69	3
New Mexico	17	23
Arizona	37	23
Utah [2]	70	100
Nevada	0	----------
PACIFIC		
Washington	101	26
Oregon	5	36
California	280	198
Total	4,095	2,508
8 weeks	33,208	22,093

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Feb. 22, 1941, 20 cases as follows: District of Columbia, 1; South Carolina, 1; Georgia, 11; Florida, 2; Alabama, 2; Louisiana, 1; Texas, 2.
[4] Rocky Mountain spotted fever, week ended Feb. 22, 1941, 2 cases as follows: Montana, 1; Wyoming, 1.
[5] Delayed reports of 238 cases included.

Case reports consolidated for the quarter October–December 1940

Division and State	Diphtheria	German measles	Influenza	Malaria	Measles	Meningitis, meningococcus	Ophthalmia neonatorum	Pellagra	Poliomyelitis	Puerperal septicemia	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Typhoid and paratyphoid fever	Typhus fever	Undulant fever	Whooping cough
NEW ENG.																	
Maine	10	24	53	1	986	2	1	1	2		0	102	0	11		6	313
New Hampshire	1		2		13	0			3		0	52	0	3		1	59
Vermont		49	7		216	2			2		0	116	0	7		12	129
Massachusetts	43	109		2	2,770	20	(1)	4	11		0	1,387	0	26		12	2,694
Rhode Island	7	5	1	1	21	3			4		0	81	0	7	1	2	81
Connecticut	5	21	27		59	4	1		4		0	302	0	21		38	1,073
MID. ATL.																	
New York	122	413		23	7,111	33	[2] 22		68		0	2,515	0	146	8	86	5,322
New Jersey	121	106	51	1	2,716	7	28		26		0	1,176	0	22	2	13	1,826
Pennsylvania	172	116		5	9,909	22	8		73		0	2,296	0	136	1	37	7,341
E. NO. CEN.																	
Ohio	170	60	303	4	700	13		1	265	5	0	2,037	3	77	2	36	3,667
Indiana	150		1,465	8	212	10			163		1	1,023	10	32	1	11	221
Illinois	260	75	114	25	5,043	9	8	1	276		1	3,263	67	82		49	2,047
Michigan	118	114	81	11	6,024	16			364		0	1,952	50	30		23	4,305
Wisconsin	8	11	451		3,268	6			250		0	1,450	46	11		40	1,704
W. NO. CEN.																	
Minnesota	33		20	1	290	3			130		0	802	223	11		31	1,051
Iowa	54	12	261	4	734	6			286		0	825	12	20		58	309
Missouri	119		60	7	117	10			115		0	661	6	79		7	664
North Dakota	47	4	299		51	5			19		0	132	17	7			245
South Dakota	21		1		25	2			23		0	243	6	4		1	45
Nebraska	12		5		93	2			85		0	224	8	5			154
Kansas	51	5	4,151	3	431	3		1	107		0	919	4	20		22	1,000
SO. ATL.																	
Delaware	7				70	1			1		0	91	0	4			364
Maryland	58	27	52	8	55	4	2		5		0	473	0	38	1	4	1,048
Dist. of Col	25		15		22	1			1		0	128	0	5		1	120
Virginia	307		1,864	16	683	19		9	120		3	620	0	87	2	5	895
West Virginia	92		197	1	139	9		1	202		0	544	2	39	1	1	397
North Carolina	564	63	68	208	315	10		13	20		1	1,174	9	65	24	1	1,925
South Carolina	463	42	3,251	1,817	166	0	8	338	3		0	277	0	38	48	13	352
Georgia	225		1,399	379	125	5		45	9	1	0	438	0	95	219	21	170
Florida	84		112	38	18	1		25	15		0	46	1	37	22	4	73

See footnotes at end of table.

Case reports consolidated for the quarter October–December 1940—Continued

Division and State	Diphtheria	German measles	Influenza	Malaria	Measles	Meningitis, meningococcus	Ophthalmia neonatorum	Pellagra	Poliomyelitis	Puerperal septicemia	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Typhoid and paratyphoid fever	Typhus fever	Undulant fever	Whooping cough
E. SO. CEN.																	
Kentucky	132	----	1,364	9	1,180	17	----	1	68	----	1	855	1	117	----	7	998
Tennessee	149	9	466	86	323	9	1	15	20	3	1	957	14	83	12	11	556
Alabama	246	2	937	1,738	237	23	----	45	15	----	0	376	0	60	96	8	262
Mississippi	150	----	21,211	6,357	433	7	26	807	12	86	0	209	2	19	23	7	1,775
W. SO. CEN.																	
Arkansas	155	2	7,067	582	392	1	2	48	8	3	0	187	12	97	----	10	258
Louisiana	151	----	14,510	174	15	7	----	14	42	----	0	124	3	107	41	32	191
Oklahoma	266	----	4,367	450	35	6	3	25	24	----	0	296	13	67	1	24	248
Texas	475	----	20,544	1,558	359	11	17	285	43	----	0	541	16	139	110	42	1,493
MOUNTAIN																	
Montana	48	12	1,204	----	97	3	1	----	16	----	0	228	7	10	----	1	48
Idaho	5	1	1,229	----	19	1	----	----	21	----	[3] 5	162	3	26	----	2	85
Wyoming	4	12	1,603	----	22	2	----	----	22	2	0	86	0	3	----	----	20
Colorado	61	----	1,010	----	551	2	----	----	14	----	0	297	4	27	----	9	326
New Mexico	12	9	138	71	329	1	----	10	5	1	0	86	0	55	----	1	195
Arizona	57	17	6,259	6	432	3	----	17	4	----	0	61	8	11	1	8	122
Utah	7	8	18,780	2	35	1	----	----	26	----	0	116	1	13	----	2	252
Nevada	4	----	2,433	----	----	0	----	----	1	2	0	5	1	3	----	----	6
PACIFIC																	
Washington	50	383	9,005	1	315	7	----	----	[4] 134	----	0	371	2	28	----	13	756
Oregon	42	----	6,460	15	162	3	----	----	21	----	0	173	31	18	----	1	138
California	238	247	45,543	26	717	15	13	----	71	----	0	1,295	6	91	8	63	3,742
Total	5,601	1,958	178,440	13,638	48,035	347	141	1,706	3,219	103	13	31,794	579	2,139	624	781	51,065
Alaska	----	1	347	----	67	1	----	----	----	----	----	----	----	3	----	----	----
Hawaii	19	103	16,038	----	417	----	----	----	----	----	----	1	----	5	11	2	50
Puerto Rico [5]	230	----	79,413	6,637	361	4	3	14	4	41	----	1	----	75	----	----	358

[1] 143 cases of ophthalmia neonatorum and suppurative conjunctivitis reported.
[2] Exclusive of New York City.
[3] Delayed reports.
[4] Delayed reports included.
[5] Reports for June to September, inclusive.

Case reports consolidated for the quarter October–December 1940—Continued

Case reports consolidated for the quarter October–December 1940—Continued

Division and State	Actinomycosis	Chickenpox	Dysentery, amoebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, epidemic or lethargic	Encephalitis, equine	Hookworm disease	Mumps	Rabies in animals	Rabies in man	Septic sore throat	Tetanus	Trachoma	Trichinosis	Tularemia	Vincents' infection
NEW ENG.																	
Maine		729							199			4	1		2		6
New Hampshire		55							170			4					
Vermont		762		4					237			4					79
Massachusetts	2	3,439	2	36		2			1,180	16		44	2	4	14		
Rhode Island		205	1	1					64	3	[1]1	38				1	
Connecticut		1,364	1	16		1			603			48		2	6	1	
MID. ATL.																	
New York		7,750	17	215		21				[2]27	2	192	11		55		[2]147
New Jersey		4,816	14	4		3			2,203	56	1	24	5	1	14	1	
Pennsylvania		10,455	18	6		10			4,293						2	6	
E. NO. CEN.																	
Ohio		4,472	4	81		2			505		1	37	6	15	12	48	
Indiana		1,015		4		1			293	57		6	1			76	
Illinois	4	4,752	17	61		7			1,996	56		6	10	122	3	137	76
Michigan	1	4,924	7	5		2		1		1		285	6		1	9	58
Wisconsin		6,926				3			1,687			24		1		10	
W. NO. CEN.																	
Minnesota	3	2,632	6	4		1				2		28	1	2	1	3	
Iowa		931		4		1			452	[3]28		3				16	
Missouri		584		7		1			56			22		156		40	
North Dakota	1	371			2	5			231			3		1			6
South Dakota		266							29			3		14			
Nebraska		367				1			24			4					
Kansas		1,297	1	6	5	8			40			23	1			15	45
SO. ATL.																	
Delaware		182							24								
Maryland		875	3	34	11	1			151			46			10	4	57
Dist. of Col		164														1	
Virginia		867	2	296		3			239			323	2	1		11	
West Virginia		509		60		1			229			2				4	
North Carolina		1,184		2							1	25		1		4	26
South Carolina		204	4					256	168	44	1		1			3	
Georgia		315	21	48				2,672	114			136		2		19	
Florida		57	12			5		1,334	39	2		5	1			8	9

See footnotes at end of table.

Case reports consolidated for the quarter October–December 1940—Continued

Division and State	Actinomycosis	Chickenpox	Dysentery, amoebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, epidemic or lethargic	Encephalitis, equine	Hookworm disease	Mumps	Rabies in animals	Rabies in man	Septic sore throat	Tetanus	Trachoma	Trichinosis	Tularemia	Vincents' infection
E. SO. CEN.																	
Kentucky		1,029	3	132		4			1,371		1	144				85	
Tennessee	1	544	3	45		1			233			54	6	133		11	29
Alabama		313	1			2			153	42			8			3	
Mississippi		1,342	328	968				1,683	812	14				41			
W. SO. CEN.																	
Arkansas		230	15	15				3	429	46		120	1	346	1	4	
Louisiana		63	12	10				156	11	12		24	12	94		7	
Oklahoma		195	7	101		2			79	18		142	6	128		10	31
Texas		1,083	36	235		3			425	19				10		5	
MOUNTAIN																	
Montana		780		3		3			62			11		9		2	
Idaho		391							250			6				1	7
Wyoming		281			1	2			184			8			1	11	2
Colorado		1,167	4	1		2			289			31				6	
New Mexico	1	140	4	23	22				128	49		7					
Arizona		251			347	1			256					116		1	
Utah		1,039	2			2			147			7		220		2	
Nevada		56				2			19			1					
PACIFIC																	
Washington		1,644	5	13		8	5		1,180	4		13		4			8
Oregon		815	4	2		2			211	24		10		5			29
California		4,659	49	156		28			2,458	123		28	17	97	7	6	
Total	13	78,491	603	2,598	388	141	5	6,105	23,923	643	8	1,945	98	1,525	129	571	615
Alaska		115							1								2
Hawaii	1	73	1					31	21			1	5	5			
Puerto Rico [4]		82			120				13				56				

[1] Case occurred in August.
[2] Exclusive of New York City.
[3] Delayed reports included.
[4] Reports for June to September, inclusive.

Anthrax: Massachusetts, 3; New York, 4; New Jersey, 6; Pennsylvania, 7; Delaware, 1; Arkansas, 1; California, 2.
Dengue: South Carolina, 8; Florida, 1; Louisiana, 6; Texas, 2.
Diarrhea: Ohio, 268 (under 2 years; enteritis included); Michigan, 2 (infant diarrhea); Maryland, 60; South Carolina, 1,374.
Food poisoning: New Mexico, 1; Washington, 94; California, 136.
Granuloma, coccidioidal: California, 17.
Leprosy: Hawaii Territory, 9; Puerto Rico, 9; Pennsylvania, 1; Maryland, 1; Florida, 3; Louisiana, 3; Texas, 6.
Psittacosis: Connecticut, 1; Ohio, 1; California, 1.
Relapsing fever: Texas, 4; California, 6.
Weil's disease: Hawaii Territory, 1; Michigan, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 8, 1941

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	155	1,272	141	3,652	932	1,812	32	377	18	1,074	------
Current week	65	3,137	159	7,532	687	1,143	5	393	12	1,111	------
Maine: Portland	0	------	0	1	8	0	0	0	0	2	33
New Hampshire:											
Concord	0	------	1	0	2	3	0	1	0	0	20
Manchester	0	------	1	0	1	5	0	0	0	0	35
Vermont:											
Barre	0	------	0	0	1	0	0	1	0	0	4
Burlington	0	------	0	0	0	0	0	0	0	0	11
Rutland	0	------	0	0	0	0	0	0	0	0	4
Massachusetts:											
Boston	0	------	3	153	25	40	0	11	0	79	253
Fall River	0	------	1	0	0	2	0	1	0	8	36
Springfield	0	------	0	1	7	6	0	2	0	1	44
Worcester	0	------	0	85	5	3	0	2	0	5	56
Rhode Island:											
Pawtucket	0	------	0	0	2	0	0	0	0	0	20
Providence	0	10	2	0	7	4	0	1	0	6	81
Connecticut:											
Bridgeport	0	12	1	1	5	2	0	0	0	2	39
Hartford	0	19	0	2	3	0	0	0	0	6	47
New Haven	0	1	2	0	4	17	0	0	0	14	56
New York:											
Buffalo	0	5	7	80	13	15	0	7	0	20	186
New York	11	427	16	2,357	136	189	0	103	2	116	1,920
Rochester	0	------	0	6	7	4	0	1	1	4	101
Syracuse	0	------	0	0	3	4	0	0	0	6	68
New Jersey:											
Camden	0	3	1	55	10	4	0	1	0	2	47
Newark	0	50	3	173	12	43	0	5	0	7	155
Trenton	0	13	1	6	6	59	0	2	0	1	36
Pennsylvania:											
Philadelphia	7	20	11	911	47	91	0	35	0	58	625
Pittsburgh	0	12	6	8	24	13	0	8	0	30	213
Reading	0	1	5	262	3	0	0	1	0	5	33
Scranton	0	------	------	1	------	1	0	------	0	0	------
Ohio:											
Cincinnati	3	36	2	34	14	9	0	8	0	2	180
Cleveland	2	275	0	785	12	22	0	13	0	76	243
Columbus	0	4	4	43	7	5	0	7	0	16	115
Toledo	0	4	1	2	4	3	0	5	0	22	97
Indiana:											
Anderson	0	------	0	1	2	0	0	1	0	1	9
Fort Wayne	0	------	0	13	4	1	0	1	0	0	33
Indianapolis	1	------	3	9	17	14	0	9	0	3	139
Muncie	0	------	1	3	2	7	0	0	0	2	14
South Bend	0	------	0	3	3	2	0	0	0	0	18
Terre Haute	0	------	0	0	4	0	0	0	0	0	19
Illinois:											
Alton	0	2	2	0	2	2	0	0	0	0	------
Chicago	6	37	7	1,280	44	199	0	32	1	69	760
Elgin	0	------	0	6	3	0	0	0	0	0	10
Moline	0	------	0	9	0	2	0	0	0	0	9
Springfield	0	------	0	0	3	1	0	0	0	0	27
Michigan:											
Detroit	2	41	6	802	31	87	0	18	0	102	343
Flint	0	------	6	35	6	4	0	0	0	7	40
Grand Rapids	0	1	2	23	4	2	0	0	0	13	37
Wisconsin:											
Kenosha	0	1	0	19	0	1	0	0	0	1	15
Madison	0	------	0	2	0	3	0	0	0	1	15
Milwaukee	0	------	0	36	3	96	0	0	0	34	109
Racine	1	------	0	3	0	1	0	0	0	0	19
Superior	0	------	0	0	0	4	0	0	0	0	8
Minnesota:											
Duluth	0	------	1	0	3	1	3	0	0	9	30
Minneapolis	0	660	0	1	6	6	0	0	0	17	113
St. Paul	0	3	3	0	7	5	0	1	0	6	70

City reports for week ended February 8, 1941—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Iowa:											
Cedar Rapids	0	----	----	0	----	0	0	----	0	0	----
Davenport	0	----	----	0	----	1	0	----	0	0	----
Des Moines	2	----	----	0	----	3	0	----	0	3	38
Sioux City	1	----	----	0	----	1	0	----	0	1	----
Waterloo	0	----	----	0	----	1	0	----	0	0	----
Missouri:											
Kansas City	0	----	1	10	8	8	2	4	0	21	84
St. Joseph	0	----	0	0	3	0	0	0	0	1	22
St. Louis	1	20	2	18	20	35	0	3	0	17	266
North Dakota:											
Fargo	0	----	0	0	1	2	0	0	0	4	6
Grand Forks	0	----	----	0	----	0	0	----	0	0	----
Minot	0	----	----	0	----	0	0	----	0	1	3
South Dakota:											
Aberdeen	0	----	----	0	----	2	0	----	0	5	----
Sioux Falls	0	----	----	0	----	6	0	----	0	0	5
Nebraska:											
Lincoln	0	----	----	2	----	4	0	----	0	0	----
Omaha	0	----	0	0	4	7	0	0	0	1	56
Kansas:											
Lawrence	0	3	0	12	0	0	0	0	0	2	6
Topeka	0	1	1	16	0	1	0	1	0	0	22
Wichita	0	2	0	3	6	1	0	3	0	13	38
Delaware:											
Wilmington	0	----	0	18	4	2	0	3	0	3	44
Maryland:											
Baltimore	0	45	4	12	22	38	0	10	1	70	236
Cumberland	0	1	0	0	1	0	0	0	0	2	10
Frederick	0	----	0	0	0	0	0	0	0	0	7
Dist. of Col.:											
Washington	0	79	5	14	13	9	0	12	1	5	187
Virginia:											
Lynchburg	0	----	0	1	3	0	0	0	1	2	24
Norfolk	1	117	0	0	9	3	0	1	0	1	32
Richmond	0	171	1	4	7	1	0	5	0	1	65
Roanoke	0	----	0	121	2	1	0	0	0	11	18
West Virginia:											
Charleston	0	----	0	6	2	1	0	0	0	0	14
Huntington	1	----	----	0	----	0	0	----	0	0	----
Wheeling	0	----	1	1	3	2	0	0	0	11	22
North Carolina:											
Gastonia	0	----	----	1	----	0	0	----	0	4	----
Raleigh	0	100	1	10	3	0	0	0	0	25	13
Wilmington	1	----	----	1	----	0	0	----	0	0	----
Winston Salem	0	5	1	2	4	1	0	1	0	19	20
South Carolina:											
Charleston	1	413	1	10	2	2	0	1	0	2	27
Florence	0	31	0	4	1	0	0	0	0	0	9
Greenville	1	----	0	7	5	1	0	3	0	16	23
Georgia:											
Atlanta	0	27	5	1	0	6	0	5	0	0	86
Brunswick	0	----	0	0	2	0	0	1	0	0	5
Savannah	0	159	6	3	3	2	0	1	0	0	50
Florida:											
Miami	0	14	0	0	2	1	0	2	0	1	53
Tampa	2	1	1	0	0	0	0	0	0	0	32
Kentucky:											
Ashland	1	----	0	1	0	0	0	0	0	0	6
Covington	1	2	0	18	3	0	0	0	0	0	15
Lexington	0	----	0	0	3	0	0	0	0	1	19
Louisville	0	19	3	17	7	28	0	1	1	9	80
Tennessee:											
Knoxville	1	18	1	7	2	4	0	0	0	3	20
Memphis	1	28	5	20	5	5	0	4	0	12	85
Nashville	0	----	2	9	4	3	0	1	0	5	53
Alabama:											
Birmingham	1	166	5	6	7	3	0	2	1	5	85
Mobile	0	13	4	4	0	1	0	0	0	0	31
Montgomery	2	2	----	4	----	0	0	----	0	0	----
Arkansas:											
Fort Smith	0	----	----	0	----	0	0	----	0	0	----
Little Rock	0	23	1	4	4	0	0	2	0	1	20
Louisiana:											
Lake Charles	0	----	----	0	----	0	0	----	0	0	7
New Orleans	0	37	4	0	14	1	0	7	1	1	173
Shreveport	1	----	0	0	2	0	0	2	0	0	54

City reports for week ended February 8, 1941—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Oklahoma:											
Oklahoma City	1	57	2	1	6	5	0	0	0	2	44
Tulsa	1	-----	0	1	9	0	0	1	0	20	23
Texas:											
Dallas	1	1	1	4	4	9	0	1	1	0	71
Fort Worth	0	-----	0	86	4	1	0	2	0	0	42
Galveston	0	-----	1	0	0	0	0	1	0	0	12
Houston	1	1	2	0	6	0	0	3	0	1	79
San Antonio	2	9	2	0	6	1	0	7	0	2	78
Montana:											
Billings	4	-----	0	0	0	0	0	0	0	0	6
Great Falls	0	-----	0	3	2	1	0	0	0	0	5
Helena	0	29	0	0	0	0	0	0	0	1	6
Missoula	0	-----	0	0	0	0	0	0	0	0	7
Idaho:										0	
Boise	0	-----	0	0	1	0	0	0	0	0	4
Colorado:											
Colorado Springs	0	-----	0	0	0	4	0	1	0	4	10
Denver	5	43	1	12	1	11	0	2	0	31	78
Pueblo	0	-----	0	0	2	3	0	0	0	6	9
New Mexico:											
Albuquerque	0	-----	0	0	1	0	0	0	1	0	8
Utah:											
Salt Lake City	1	-----	0	3	0	2	0	2	0	10	34
Washington:											
Seattle	0	-----	1	7	3	3	0	5	0	9	103
Spokane	0	2	1	2	0	2	0	0	0	5	30
Tacoma	0	-----	0	1	2	1	0	2	0	4	35
Oregon:											
Portland	1	3	0	15	5	2	0	1	0	1	92
Salem	0	-----	-----	1	-----	0	0	-----	0	0	-----
California:											
Los Angeles	2	121	4	13	3	11	0	20	2	25	385
Sacramento	6	9	0	0	4	2	0	2	0	6	36
San Francisco	2	-----	1	6	8	6	0	9	0	52	185

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
New York:				Virginia:			
Buffalo	2	0	0	Richmond	0	1	0
New York	3	0	0	South Carolina:			
Pennsylvania:				Florence	1	0	0
Pittsburgh	1	0	0	Georgia:			
Michigan:				Atlanta	1	1	0
Detroit	0	0	1	Tennessee:			
Missouri:				Knoxville	0	1	0
Kansas City	0	1	0	Alabama:			
St. Joseph	0	1	0	Birmingham	1	0	0
St. Louis	1	0	0	Mobile	1	0	0
Maryland:				California:			
Baltimore	0	0	1	San Francisco	1	0	0
Cumberland	1	0	0				

Encephalitis, epidemic or lethargic.—Cases: New York, 2; Pittsburgh, 1; Detroit, 1; Florence, 1.
Pellagra.—Cases: Baltimore, 1; Charleston, 2; Brunswick, 1; Dallas, 1; San Francisco, 1.
Typhus fever.—Cases: Brunswick, 2; Savannah, 5; New Orleans, 1; Dallas, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 18, 1941.—During the week ended January 18, 1941, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		9	1	11	15	1	3	5	2	47
Chickenpox		4	2	152	501	54	23	47	115	898
Diphtheria		31		16	1	2	1			51
Influenza		187			128	9	4		343	671
Measles		303	16	134	452	233	111	423	571	2,243
Mumps				105	169	34	8	12	22	350
Pneumonia		15			31	1	2		18	67
Poliomyelitis				1						1
Scarlet fever		25	4	80	153	14	7	8	12	303
Trachoma									1	1
Tuberculosis	1	2	1	99	31	6				140
Typhoid and paratyphoid fever				22	5	2	3			32
Whooping cough		1		201	166	23	14	35	20	460

CUBA

Habana—Communicable diseases—4 weeks ended January 11, 1941.—During the 4 weeks ended January 11, 1941, certain communicable diseases were reported in Habana, Cuba, as follows:

	Cases	Deaths		Cases	Deaths
Diphtheria	25	1	Tuberculosis		3
Malaria	4		Typhoid fever	19	1
Scarlet fever	6				

ICELAND

Influenza.—On February 9, 1941, the American Consul at Reykjavik, Iceland, reported an epidemic of influenza in that city and also in Isafjordur. Especially severe bronchitis accompanied the influenza. Schools and theaters were closed.

JAMAICA

Vital statistics—Year 1939.—The following table shows the numbers of births and deaths reported in the island of Jamaica for the year 1939:

Number of births	37,474
Births per 1,000 population	31.64
Number of deaths	17,536
Deaths per 1,000 population	14.8
Deaths under 1 year per 1,000 live births	121
Deaths from:	
Appendicitis	43
Cancer and other malignant tumors	334
Congenital debility	1,671
Diarrhea and enteritis	484
Deaths from—Continued.	
Infantile convulsions (under 5 years of age)	1,184
Malaria	480
Nephritis, chronic	457
Pneumonia	566
Syphilis	517
Tuberculosis (pulmonary)	970
Typhoid fever	227
Unspecified causes	1,366

PANAMA CANAL ZONE

Notifiable diseases—October–December 1940.—During the months of October, November, and December 1940, certain notifiable diseases were reported in the Panama Canal Zone, including terminal cities, as follows:

Disease	October		November		December	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	5		3		7	
Diphtheria [1]	15		9	2	12	1
Dysentery (amoebic)	13	3	9	1	10	1
Dysentery (bacillary)	2	2	3	2	5	
Malaria	193	2	175	3	229	4
Measles	15		16		2	
Paratyphoid fever [1]					1	
Pneumonia		25		28		26
Poliomyelitis					1	
Tuberculosis		31		32		49
Typhoid fever [1]	3		1			
Whooping cough [2]	6	1	7		8	

[1] Exclusive of carriers.
[2] Canal Zone only.

SWITZERLAND

Notifiable diseases—October 1940.—During the month of October 1940, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	34	Paratyphoid fever	4
Chickenpox	136	Poliomyelitis	42
Diphtheria	84	Scarlet fever	516
German measles	17	Tuberculosis	288
Influenza	31	Typhoid fever	13
Measles	255	Undulant fever	12
Mumps	48	Whooping cough	289

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-November 1940	December 1940	January 1941—week ended—			
				4	11	18	25
ASIA							
Ceylon	C	1					
China:							
Dairen	C	2					
Foochow	C	625					
Hong Kong	C	848	19	3			
Macao	C	513					
Manchuria	C	31					
Shanghai	C	571					
Shantung Province	C	244					
India	C	[1] 43,094					
Bassein	C	164					
Bombay	C	13					
Calcutta	C	2,239	79				
Cawnpore	C	333					
Chittagong	C	4					
Karachi	C	65					
Madras	C	1					
Moulmein	C	16					
Porto Novo	C	1					
Rangoon	C	43	18				
Vizagapatam	C	21					
India (French)	C	34					
Indochina (French)	C	436					
Thailand	C	235					

[1] January to Aug. 10, 1940.

PLAGUE

AFRICA							
Algeria	C	22	1				
Plague-infected rats		2					
Belgian Congo	C	26					
British East Africa:							
Kenya	C	9					
Uganda	C	222					
Egypt	C	[1] 409					
Madagascar	C	551	47				[2] 51
Morocco [3]	C	30					
Rhodesia, Northern	C	1					
Senegal:							
Dakar	D	[4] 1					
Thies	C	1					
Tivaouane	C	3					
Tunisia: **Tunis**	C	10				1	1
Plague-infected rats		1					
Union of South Africa	C	[5] 35	2				

[1] Includes 5 cases of pneumonic plague.
[2] For the month of January 1941.
[3] A report dated May 11, 1940, also stated that there was an epidemic of bubonic plague in southern Morocco where several hundred cases had been unofficially reported.
[4] Imported.
[5] Includes 6 cases of pneumonic plague.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths]

Place		January–November 1940	December 1940	January 1941—week ended—			
				4	11	18	25
ASIA							
China.[6]							
Dutch East Indies:							
Java and Madura	C	350					
West Java	C	8					
India	C	[7] 14,438					
Bassein	C	18					
Cochin	C	1					
Plague-infected rats		5					
Rangoon	C	6					
Indochina (French)	C	4	1				
Thailand:							
Bangkok	C	3					
Plague-infected rats		2					
Bisnulok Province	C	3					
Chingmai	C	3					
Dhonpuri Province	C	1					
Jayanad Province	C	3					
Kamphaeng Bajr Province	C	29					
Kanchanapuri Province	C	12					
Koan Kaen Province	C	5					
Nagara Svarga Province	C	30					
Noangkhay Province	C	4					
Sukhodaya Province	C	22					
EUROPE							
Portugal: Azores Islands	C	3					
SOUTH AMERICA							
Argentina:							
Catamarca Province	C	8	2				
Cordoba Province	C	[8] 47	7				
Jujuy Province	C	9					
La Rioja Province	C	1					
Salta Province	C	8					
San Luis Province	C	1	1				
Santiago del Estero Province	C	80	5				
Tucuman Province	C	21					
Brazil:							
Alagoas State	C	9					
Pernambuco State	C	4					
Ecuador: El Oro Province	C	6					
Peru:							
Cajabamba Department	C	1					
Cajamarca Department	C	28					
Lambayeque Department	C	15					
Libertad Department	C	52					
Lima Department	C	56					
Piura Department	C	6					
Tumbes Department	C	[9] 20					
OCEANIA							
Hawaii Territory: Plague-infected rats		44	[10] 10	1			

[6] Information dated July 7 states that up to July 6, 17 cases of plague had been reported near Tungliao, Hsingan Province, China; and a report dated July 13 states that an outbreak of bubonic plague occurred along the Yunnan-Burma border in the districts of Loiwing, Chefang, Juili, and Muchieh. Information dated Aug. 17 states that 45 cases of plague with 36 deaths have occurred in Nungen District and a telegram dated Oct. 2 states that 15 cases of bubonic plague with 3 deaths occurred in Hsinking, Manchuria. During the week ended Nov. 16, 1940, an epidemic of bubonic plague was reported in Ningpo District, Chekiang Province, China.

[7] January to Aug. 10, 1940.

[8] Includes 15 cases of pneumonic plague.

[9] Includes 3 suspected cases.

[10] During the week ended Dec. 7, a positive mass inoculation of 12 rats and 1 mouse was also reported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

[C indicates cases; D, deaths]

Place		January–November 1940	December 1940	January 1941—week ended— 4	11	18	25
AFRICA							
Algeria	C	6				1	
Angola	C	186					
Belgian Congo	C	3,749					
British East Africa	C	59					
Dahomey	C	81	8				134
French Guinea	C	16					11
Gibraltar	C	[1] 1					
Ivory Coast	C	131	1		3		5
Nigeria	C	2,236					
Niger Territory	C	640	13		2		7
Nyasaland	C	75					
Portuguese East Africa	C	1					
Rhodesia:							
Northern	C	6					
Southern	C	249	10				
Senegal	C	149	11		16		
Sierra Leone	C	10					
Sudan (Anglo-Egyptian)	C	532	3		1		
Sudan (French)	C	3					
Union of South Africa	C	180					
ASIA							
Arabia	C	255					
China	C	907	8	8	2	4	1
Chosen	C	544					
Dutch East Indies—Sabang	C	4					
India	C	[2] 154,740					
India (French)	C	5					
India (Portuguese)	C	20					
Indochina (French)	C	1,561	42		19		14
Iran	C	177					
Iraq	C	774	161	52	28		
Japan	C	502				[3] 46	
Straits Settlements	C	1					
Sumatra	C	1					
Thailand	C	202	2		12		12
EUROPE							
France	C	[4] 4					
Great Britain	C	2					
Greece	C	23					
Portugal	C	504					
Spain	C	976	114	8		7	
Turkey	C	139					
NORTH AMERICA							
Canada	C	12	5				
Guatemala	C	35					
Mexico	C	55					1
SOUTH AMERICA							
Bolivia	C	288					
Brazil	C	3					
Colombia	C	1,915				1	
Ecuador	C	1					
Peru	C	212					
Venezuela (alastrim)	C	213	11				

[1] Imported.
[2] January to Aug. 10, 1940.
[3] For 3 weeks.
[4] For the month of June 1940.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths]

Place		January–November 1940	December 1940	January 1941—week ended—			
				4	11	18	25
AFRICA							
Algeria	C	1,965	181			33	
Belgian Congo	C	1,210					
British East Africa	C	2					
Egypt	C	3,636					
Eritrea	C	63					
Morocco	C	310					
Rhodesia, Northern	C	7					
Tunisia	C	539	112	23	45	24	58
Union of South Africa	C	292	6				
ASIA							
China	C	2,151	40	8			
Chosen	C	359					
India	C	3					
Indochina (French)	C	2					
Iran	C	253	3				
Iraq	C	158	1	2			
Japan	C	2					
Palestine	C	203					
Straits Settlements	C	11	1				
Sumatra	C	[1] 196					
Trans-Jordan	C	15					
EUROPE							
Bulgaria	C	154	1			1	9
France	C	1					
Germany	C	213	17	4			
Greece	C	39	4			1	1
Hungary	C	78	1		17		14
Irish Free State	C	10		1			
Lithuania	C	115					
Rumania	C	1,286	117	17		48	47
Spain	C	14					
Turkey	C	524					
Yugoslavia	C	282			6		
NORTH AMERICA							
Guatemala	C	301	8				
Mexico	C	202	9		1		1
Panama Canal Zone	C	3					
SOUTH AMERICA							
Bolivia	C	626					
Chile	C	357		1			
Ecuador	C	2					[2] 16
Peru	C	988					
Venezuela	C	12	2			1	
OCEANIA							
Australia	C	11	1				
Hawaii Territory	C	26	2		2		

[1] For the period May to August 1940, inclusive.
[2] For the month of January 1941.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–November 1940	December 1940	January 1941—week ended—			
				4	11	18	25
AFRICA							
Belgian Congo: Yatolet	C	1					
Cameroon: Nkongsamba	C	[1] 1					
French Equatorial Africa: Fort Archambault	C	[1] 1					
Gold Coast	C	1					
Ivory Coast	C	[2] 5	[1] 1				1
Nigeria:							
Ibadan	C	1					
Oshogbo	C	[1] 1					
Sudan (Anglo-Egyptian): Kordofan Province [3]	C	858					
Sudan (French): Segou	C	[1] 1					
Togo (French)	C	1					
SOUTH AMERICA							
Brazil:							
Bahia State	D	1					
Espirito Santo State	D	[4] 140					
Minas Geraes State	D	2					
Para State	D	1					
Rio de Janeiro State	D	[5] 5					
Santa Catarina State	D	2					
Colombia:							
Antioquia Department—San Luis	D	2					
Caldas Department—							
La Pradera	D	1					
Samana	D	1					
Victoria	D	1					
Cundinamarca Department	D		1				
Intendencias and Commissaries	C	1					
Meta Department	D	4	3	1			
Municipality of Jesus Maria	D	1					
Santander Department	D	3		1			
Tolima Department	D	2	4				

[1] Suspected.
[2] Includes 3 suspected cases.
[3] A report dated Nov. 13, 1940, also states that 8,000 cases of yellow fever with 800 deaths have been reported in Kordofan Province, Anglo-Egyptian Sudan.
[4] Includes 28 deaths from jungle type.
[5] Includes 1 death from jungle type.